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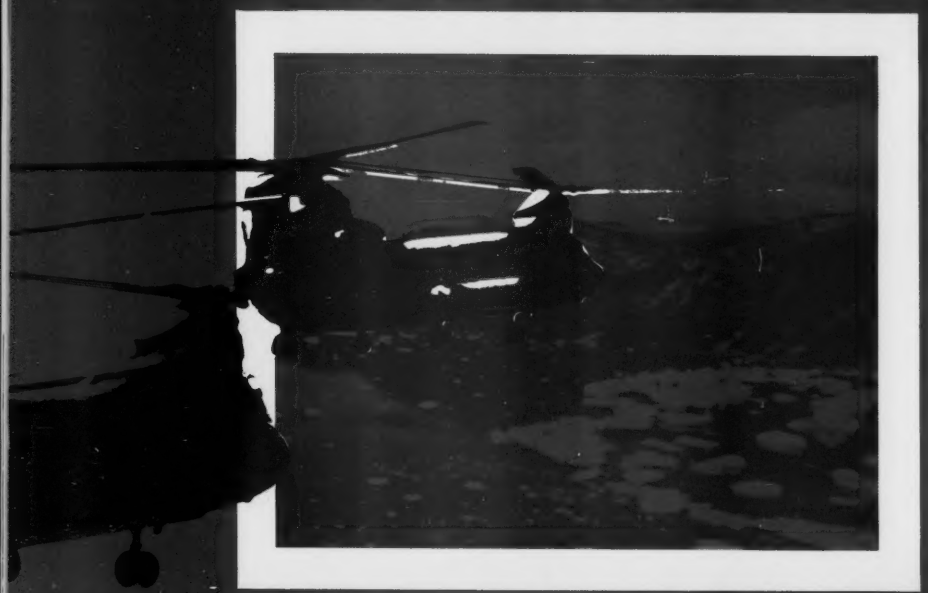
MARCH 1980

AVIATION DIGEST



OPERATION NORTHERN LERP

MARCH 1980 • VOLUME 26 • NUMBER 3

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Cover: **Featured in this issue is Operation Northern Leap, the self-deployment of CH-47 Chinook helicopters from the U.S. to Europe. The cover by Fred Martin illustrates just one of the spectacular scenes the crews witnessed during their pioneer flight**

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Richard K. Tierney
Editor

The mission of the ***U.S. Army Aviation Digest (USPS 415-350)*** is to provide information of an operational, functional nature concerning safety and aircraft accident prevention, training, maintenance, operations, research and development, aviation medicine and other related data.

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Major General Small

THE SUCCESSFUL culmination of Operation Northern Leap on 20 August 1979 brought into focus the flexibility of Army aviation and demonstrated a feasible alternative to a very difficult problem which we are facing. The rapid movement of reinforcements and supplies to a no-warning or short-warning, mid-intensity, or high intensity conflict, will create unbelievable strains and queuing on the transportation resources; land, sea and air.

As tacticians employing weapon systems, we have focused much of our effort on how we will place firepower on the enemy's weapons; however, the assumption that sufficient end item replacements or supplies will be readily available is just not valid. The simple fact, as history and our current studies support, is that the tempo of the battle will be dictated by the rate at which our units and weapons are resupplied.

Self-deployment of our helicopters provides a responsiveness and self-sufficiency to forces in the field and opens a whole new realm to commanders with assigned Army aviation assets.

The Training and Doctrine Command testers; 179th Medium Lift Helicopter Company; Reserve; National Guard; Canadian; and the Aviation Research and Development Command people who participated in Northern Leap again demonstrated the potential which Army aviation can provide. Major Richard Heehn's article which begins on page 2, and Captain (P) Steve Gilbertson's article which starts on page 6, reflect the professionalism of those people who brought Operation Northern Leap to a successful conclusion. Their fine efforts are an inspiration and a source of pride for us "old, bold aviators."

MG Harold I. Small
Commander, U.S. Army Transportation Center and Commandant, U.S. Army Transportation School
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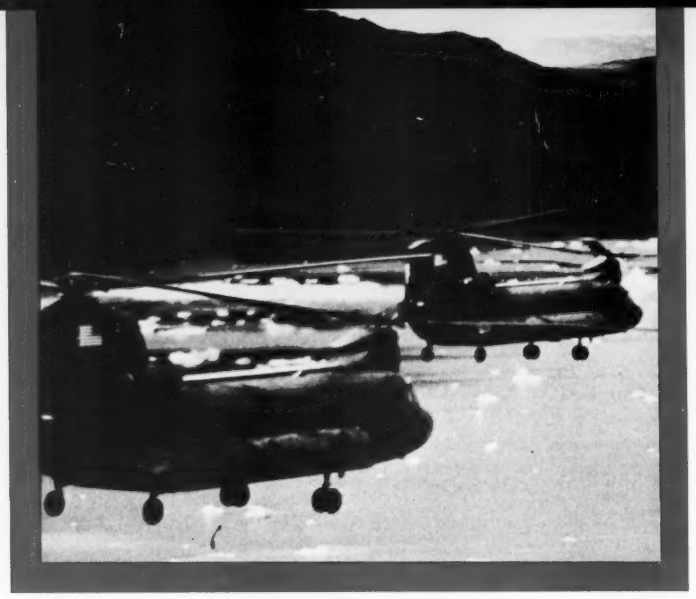


Now that the dust has settled, the TRADOC Manager for Operation Northern Leap looks back on this successful overwater flight with the luxury of 20/20 hindsight

Operation Northern Leap
20/20 Hindsight

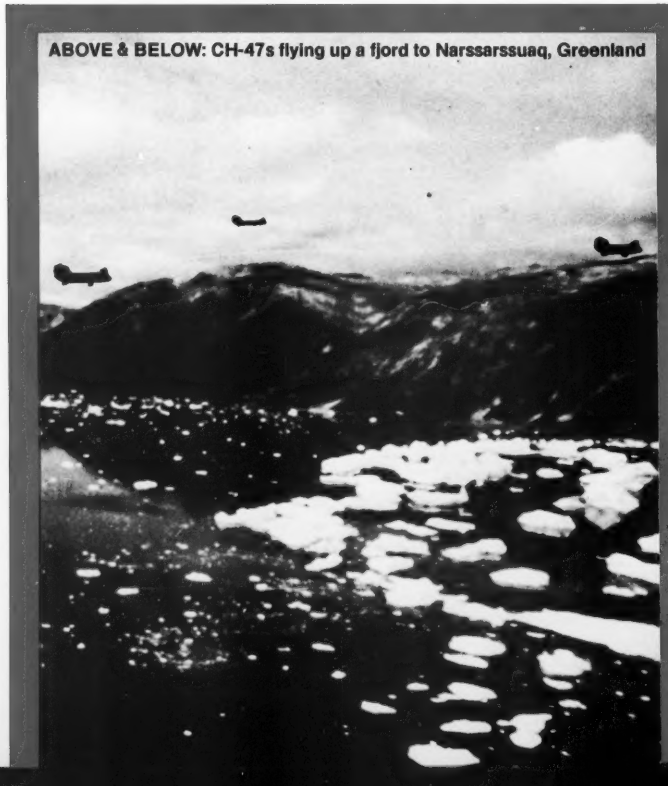
Major Richard Heehn
TRADOC Manager
Operation Northern Leap
Fort Eustis, VA

ASK ANY GROUP of Army aviators for their opinions about self-deploying helicopters to Europe, and about half will tell you you're crazy while most of the rest will say it's the only way to go. While this leaves few in between, the true value of self-deployment does seem to lie somewhere in the middle.

Self-deployment is an extremely viable option although it has obvious risks and special requirements. The purpose of Operation Northern Leap, which successfully landed four CH-47 Chinook helicopters in Heidelberg, Germany on 20 August 1979, was to develop and demonstrate the option of self-deployment and to identify as many of the risks and special requirements as possible.

The idea of self-deploying helicopters is not new. In 1952 the U.S. Air Force Military Air Transport Service flew two H-19 Chickasaw air rescue helicopters from Westover Air Force Base, MA, to Wiesbaden Air Base, Germany—a remarkable feat. However, this lead was not pursued by the Air Force to develop a full self-deployment capability. The Army endeavored to develop such a capability off and on during the next 25 years as the introduction of turbine engines, precision navigation equipment, and more reliable aircraft had made helicopter flight almost routine over legs of the distance required for self-deployment to Europe.

In the early 1970s, the Army became very serious about self-deployment and the 159th Aviation Battalion (ASH), 101st Airborne Division, demonstrated this capability in 1973 with Exercise Long Haul I, which self-deployed CH-47s from Florida to Puerto Rico (see February 1974 ***Aviation Digest***, page 41). The backing required to sup-



ABOVE & BELOW: CH-47s flying up a fjord to Narssarssuaq, Greenland

port a self-deployment test to Europe could not be generated at that time because a firm requirement could not be identified. The issue was again addressed in January 1976 in the Aviation Requirements for the Combat Structure of the Army (ARCSA) III study, which recommended that a self-deployment study be conducted. The U.S. Army Transportation School at Ft. Eustis, VA, conducted the study which essentially concluded that self-deployment is a viable option, although special training and equipment would be required.

The real catalyst for Operation Northern Leap was the Army Aviation Program Review conducted 4 and 5 December 1978. A conclusion of that review stated clearly that, because of the anticipated extreme load placed on surface shipping and airlift assets, the capability of Army helicopters to self-deploy must be pursued. Since the summer months are obviously the best time of the year to self-deploy aircraft to Europe, the timing and scope of the test became critical. First and foremost, it was necessary to demonstrate that Army helicopters can fly long legs over water and arrive in a theater mission ready without the need for extensive maintenance. In developing procedures for the advanced attack helicopter (AAH), UH-60 Black Hawk and CH-47 to self-deploy, the test objectives in the figure on page 5 were identified.

With limited time available, procurement of equipment became critical. The 2,000-gallon extended range bladder tank became the most critical item, with delivery dates scheduled for the last week in July, 1 week before the planned departure date from Ft. Carson, CO. The only other major aircraft equipment not already planned to be incorporated in the CH-47C/D as a modification work order item were two omega navigation systems and two inertial navigation systems, which were leased from contractors, and a rescue hoist system for the forward cabin door. The normal rescue method of suspending the cable through the cargo hatch would be impossible because the fuel bladder would be lying over the cargo hatch.

With the aircraft tail numbers selected and the configuration identified, the next major planning step involved crew training. As the flight route involved about 1,500 miles of overwater flight, at least some training in water survival was needed, and familiarization with life support equipment carried on the mission would be essential. The most logical way to conduct this type of training seemed to be to enlist the help of the U.S. Navy. Our requests for training support resulted in the CH-47 crewmembers attending the Navy Overwater Survival Course at Pensacola, FL in May.

The accelerated course was designed to make the students confident of their ability; to familiarize them with overwater life support equipment; and—most important—teach them how to use it. The demanding course was highlighted by a 1-mile swim in flight suit, which *everyone* successfully completed (some, after several tries). However, with completion of the course being a prerequisite to going on the mission, determination was high.

Crewmembers also were exposed to the only existing helo-dunker, a training device which simulates how a helicopter will roll in the water after ditching. Each person was required to egress four times under water through different designated exits: twice with blindfolds on to simulate night egress and twice without blindfolds. The finale of the course was extracting oneself from a parachute harness while being dragged across Pensacola Bay behind a boat and, once free, being picked out of the water by a rescue CH-46 helicopter. It was the unanimous opinion of the crewmembers that the Pensacola survival training was the most thorough and beneficial of any training they had re-

Right: Water retrieval training at Trinidad Reservoir, Colorado

ceived, and that it is an absolute must for a mission of this type.

From Pensacola the pilots proceeded to the U.S. Army Aviation Center at Ft. Rucker, AL, to fly about 20 hours each in the CH-47FS (flight simulator), as the pilots were a mixture of Reserve, National Guard, 179th Medium Lift Helicopter Company, Canadian Armed Forces, and the Transportation School. There was a necessity to get the pilots, some of whom hadn't flown a "C" model Chinook for a while, all reading off the same sheet of music. The CH-47FS training was invaluable in that it allowed two pilots who would be flying together on the mission to develop teamwork and coordination in the cockpit in reacting to the emergencies simulated by the CH-47FS. This coordination is a critical factor and cannot be practiced daily with the normal instructor pilot putting pilots through their paces.

We then proceeded to Ft. Carson, CO, and attempted to begin training on the mission aircraft with the systems installed. Things did not go well during the month of July. An accident on 4 July while training, followed by an incident on 7 July, greatly impeded aircraft availability and caused a total revamping of the training program.

Eleven days of grounding followed because of a CH-47 fleet problem with combiner transmissions. At this point it became obvious that the scheduled launch date of 1 August would have to be slipped if the crewmembers were to be exposed to mission equipment. The pilots, who wanted most of all to have some practice with the rescue hoist system, spent 2 days at Trinidad Reservoir in Colorado plucking each other from the water using the rescue hoist system.

Chasing a rubber craft around a reservoir with a helicopter can be quite a trick as rotor wash makes big problems and picking the potential survivor out of the water is not easy. The capability of self-rescue

ABOVE: SFC Robert Cloutier making repairs

BELOW: Refueling in Greenland

during the mission should an aircraft be ditched, completely negates the requirement for an escort rescue aircraft.

The CH-47s of Operation Northern Leap were better equipped navigationally and with aviation life support equipment than a fixed wing rescue aircraft which would normally escort such a mission. Although we did not receive all the training originally planned, the pilots expressed confidence in their abilities and were ready to go. So, on the morning of 6 August, Captain Steve Gilbertson, the airmission commander, gave the word to board the aircraft, culminating 6 months of intensive planning and coordination which included five major commands: Headquarters, Department of the Army; the Air Force; the Navy; the State Department; and five Allied nations.

Now that the dust has settled from Operation Northern Leap, we are allowed the luxury of 20/20 hindsight. From a possibly parochial perspective, I suggest that we've relearned a lot of the lessons of the 1952 effort with the H-19s and have come to realize how relatively simple and routine a flight of this type can be. However, with special preparation and training, that extra edge for success will be assured.

The northern route will be a problem during the winter, but it will not be entirely blocked. The airport manager at Narssarssuaq, Greenland, informed us that the scheduled airlines which fly into Narssarssuaq three times a week during the winter months complete 80 percent of their scheduled flights with only a nondirectional beacon cloud-breaking procedure for instrument letdown. The winter months would definitely lengthen the en route transit time and increase requirements for personal cold weather equipment. Because of this, the feasibility of using the southern route through the Azores should be demonstrated (see "Operation Long Haul II," October 1974 ***Aviation Digest***, page 26).

Three of the four Northern Leap CH-47s flying into Narssarssuaq, Greenland

- **Evaluate crew training requirements for self-deployment operations to Europe.**
- **Evaluate performance and characteristics of systems installed in CH-47C aircraft for self-deployment operations.**
- **Provide information on safety and human factors related to self-deployment of CH-47C/D helicopters.**
- **Identify coordination requirements with the other services and Allied nations for overflight and support during CH-47C/D self-deployment operations.**
- **Evaluate logistical requirements for CH-47C/D self-deployment operations.**
- **Validate flight routes and compatibility of these routes for self-deployment of CH-47C/D aircraft.**

The capability of the Army to self-deploy its helicopters opens a whole new realm for airmobility. The ability to be its own prime mover for contingencies anywhere in the world gives Army commanders the capability to control their own lifeline of resupply of weapon systems.

We now have successfully demonstrated the self-deployment option and have developed some experience and expertise. *However, we do not yet have a fleet self-deployment capability.* Developing that capability will require procurement of equipment and refinement of training and procedures. It also will require exposure of the aircraft and crewmembers to the mission on a regular basis.

The Black Hawk, a mature fielded aircraft, has proven its capability to fly the required distances, and with auxiliary fuel the AAH also could easily make the route. However, special requirements and procedures apply to each aircraft. To achieve a self-deployment capability, aircraft-peculiar equipment and training must be developed and exercised on a regular basis. Only then will we achieve a self-deployment capability that will provide the responsive assets required by theater commanders to help tip the scales in our favor during a conflict.

You have a seat aboard one of the Army's CH-47 Chinook helicopters that flew the Atlantic as the airmission commander of Operation Northern Leap recounts the historic flight

Operation Northern Leap

the Flight

Captain (P) Stephen H. Gilbertson
Airmission Commander
Operation Northern Leap 1979
Fort Carson, CO

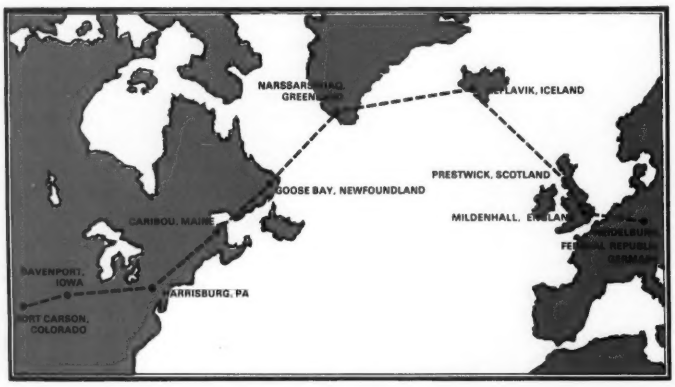
ON THE MORNING of 6 August 1979, 24 crewmembers from units all over the United States and one Canadian officer listened to Brigadier General Grail C. Brookshire, ADC (OT), 4th Infantry Division (M) wish them the best of luck in the historic flight, Operation Northern Leap, on which they were about to embark. He thanked them for the effort each had put forth.

Next, as the airmission commander, I talked to everyone briefly. I asked them to *think safety* and "slow down." It wasn't 30 minutes from that point before all four CH-47C Chinooks were airborne en route to Davenport, IA. Believe me there was a lot of suspense on everyone's part. Some I'm sure were nervous, some uncertain, but all were grateful to be off and on the way.

Davenport brought no problems. This first leg initially was computed to be the longest of the entire flight but as it turned out Iceland to Scotland was the longest; I'll explain later. The press greeted the arriving flight at Davenport as they did on every stop except Goose, Labrador and Narssarssuaq, Greenland.

The press at each location generally asked the same questions. How long can the CH-47C remain airborne? How fast can it fly? How do you feel about this mission? Do you think you will have any maintenance problems that will preclude completion of this mission? They took a lot of pictures and talked to all of the crewmembers, especially if they were from that town or state. Talking to the press was a time-consuming task, but always a pleasant one. It was interesting for me to read the following day what I said. A couple of times I was surprised.

The next morning (7 August) the flight was airborne and at 1003 hours local crossed the first waypoint. The weather forecast was to be VMC the entire route with a few scattered rain showers. No problem, but in Ohio we had to fly around some rain showers. By 1400 hours the greeting crew was standing by at the New Cumberland Army Depot. Shortly after 1430 the last aircraft was on the ground. All four executed VMC ILS approaches for practice. At NCAD the crews were conscientiously performing an extra thorough postflight inspection. We had flown 11 hours by then and had some max gross weight flying. This was the last stop we could plan to receive any major support until we reached Germany. This meant NCAD was



GLOSSARY

ADC	assistant division commander	MOC	maintenance operational check
ALSE	aviation life support equipment	MSL	mean sea level
AMC	airmission commander	NATO	North Atlantic Treaty Organization
ASR	area surveillance radar	NCAD	New Cumberland Army Depot
CENTAG	Central Army Group	NM	nautical miles
HF	high frequency	NDB	nondirectional beacon
IFR	instrument flight rules	OT	operations and training
ILS	instrument landing system	VFR	visual flight rules
IMC	instrument meteorological conditions	VIP	very important person
MAC	Military Airlift Command	VMC	visual meteorological conditions

our get-well stop and release point for the self-deployment concept. We spent 2 days at NCAD performing necessary maintenance and getting ready for the long over the water leap.

Late on the morning of 9 August we were in flight toward Loring AFB, ME. The flight had added a new member to its rank—a C-130 (MAC 41667) transport airplane commanded by Captain Scott Bietry. The C-130, carrying spare parts and additional maintenance people, would be with us all of the way to Germany. It was fully loaded with spare parts, but we fortunately did not have to use even one major end item during the entire trip.

We closed into Loring a couple of hours before dark that day. There was just enough daylight left to perform a thorough postflight inspection and complete the daily test reports.

Preparation The American Flag is placed on the aft pylon

The lobster at the club was delicious. I think most of the crewmembers enjoyed it.

Due to our later than usual arrival, our flight was not scheduled to depart Loring until 1300 hours the next day. But on runup one aircraft broke a hydraulic return line which caused a 1-hour delay. Meanwhile a low pressure system was moving in, making it necessary to leave Loring or face the possibility of being stranded for several days. We had plenty of daylight to make the rather short flight to Goose, Labrador. All the flights for the entire route were planned day/VMC which was a test restriction even though all the aircraft were IMC equipped.

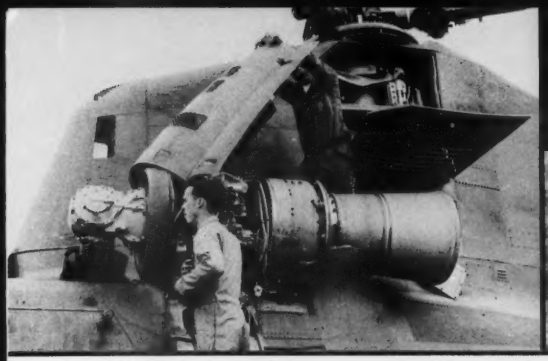
We did get off ahead of the weather and en route I noticed that the scenery was breathtaking. Some wilderness still remains in that part of the world. As I gazed at the magnificent countryside passing beneath the CH-47, I thought about how easily a person could just get lost for a lifetime in that area.

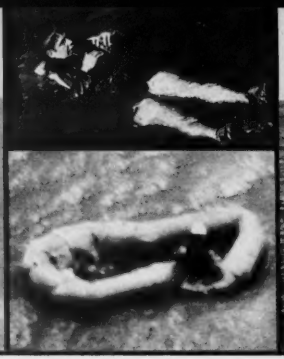
Rather brisk weather greeted us at Goose and we had to break out some of the cold weather ALSE we carried on the trip. Routine inspections were due on two aircraft, so we planned to stand-down for maintenance the following day at Goose.

That night we were guests at the Canadian Officers Club. Captain Ludwig Piron, Canadian liaison officer, had arranged to have Atlantic Char served. It was a delicious meal matched only by the fine hospitality shown to us by the Canadians.

We spent the 11th on the flight line. The pilots were busy preflighting while the maintenance folks were pulling the inspections and MOC's required. It seemed everyone was extra attentive to their duties. The next day we would embark on the first major over the water leg. The terms we had been talking about for the previous 4 months were about to become realities. Critical points were computed and recomputed. Points of safe return were compared among the crew.

The aircraft commander of the Air Force C-130 Duck Butt aircraft that would support us was at our flight briefing that evening. The Duck Butt was to orbit about 100 NM off the coast of Canada until our flight of four CH-47s and the C-130 with spare parts was reasonably assured landing at Greenland. The C-130 Duck Butt aircraft commander told the crews of his responsibility in the event of an emergency with our flight—that is, making an unscheduled landing while en route. Really, there was little a C-130 could do to aid in the rescue of one of our aircraft. The flight was totally self-sufficient. Three of the Chinooks had emergency personnel retreivals systems. A boom was installed in the main cabin door with a winch cable running through the boom to allow rescue out to the side. All aircraft had Canadian life rafts that would accommodate 10 and all crewmembers had quick down antiexposure suits. If one of our aircraft would have landed in the ocean the crews were equipped to survive for several days. Most important was the flight's total capability to rescue its own. If an aircraft would have landed I don't know of any circumstances under which the crew could not have been rescued.





Training **Left: SFC Thad Harris and SP4 Kent Perry. Center Top: Retrieval training at Trinidad Reservoir. Center Bottom: CPT (P) Steve Gilbertson, airmission commander, training with survival equipment at Pensacola. Right: Crewmembers training with survival equipment at Pensacola**

All of the pilots had questions at the flight briefing that evening. Everyone wanted to be sure all bases were covered. We had talked about the flight for 4 months and now it was finally here. The weather was forecast to be VMC the entire route. I established an 0800 hours takeoff and filed the flight plan that evening.

First thing in the morning we received a thorough updated weather briefing. The low pressure area forecasted for Loring had in fact materialized and was moving our way. Once again we would have to depart or plan to be weathered in. Each aircraft was issued a weather packet which includes all appropriate weather maps, winds aloft chart, and sea state chart, and took off.

Shortly after 0900 hours we were seeing the first of clear blue water and literally hundreds of icebergs. About 200 miles off the coast of Canada the weather started to change from what had been forecast. The very thin scattered conditions about 3,000 feet started becoming scattered. Then, about 400 miles from Goose the clouds began to thicken and become broken to overcast. The flight was level at 5,000 feet and the overcast was well below us. A check with Greenland radio on HF confirmed Narssarssuaq, Greenland was VFR. That relieved a lot of our tensions.

Soon after receiving the VFR report on the airfield at Narssarssuaq, the C-130 executed the NDB approach off the western coast of Greenland. The approach took the C-130 out over the ocean on a heading of 185 degrees and minimum descent altitude of 1,500 MSL. The C-130 leveled at 1,500 and did not break out. What next? Would our flight experience the same problems?

The C-130 executed the missed approach and headed for Sondestrom, its alternate. After receiving this report we had to recompute our fuel status to ensure that all four aircraft had enough to make it to Sondestrom. About 30 minutes off the coast of Greenland the overcast began to break up and soon we could see the coast of Greenland. Now, if for some reason the flight could not break out on the NDB approach, or the cloud breaking procedure for Narssarssuaq, we could land on the coast and wait the weather out.

When we arrived over the Simiutaq beacon the weather had almost cleared. Each aircraft made a 180-degree turn over the beacon and descended VFR. When all aircraft were below the scattered cloud layer, another 180-degree turn was made—*and there was the Fjord.* We were about to fly the 50 prettiest miles ever flown in Army aviation. We had all read articles on "the flight up the Fjord" but simply could not believe the beauty. The Fjord is narrow, I doubt if a C-130 could execute a 180-degree turn inside it. The rocks ledges go straight up on both sides. The Fjord is filled with icebergs. Someone in our flight mentioned landing on one and being photographed, but it was only a nice thought and no one was serious about attempting to land on one.

The wrecked ship, just as we had read, was right where it should be. It was a "landmark" in the water to guide aircraft up the correct Fjord to the airport. As we continued to fly formation up the Fjord the fishing boats came out to greet us. Along the shore you could see people coming to look at who was creating all the noise. Finally we rounded the last bend and there was Narssarssuaq airport. The tower cleared us for a low approach and a left downwind entry. The "whole town"—about 50 people were out to greet us. Everyone was inquisitive about the CH-47s and we conducted several guided tours through the aircraft. The people were very polite.

We landed in the early afternoon, so the crewmembers went immediately to their postflight tasks. An early morning departure was planned.

The accommodations in Narssarssuaq were quite pleasant, especially for such a remote place. No complaints were heard from the crewmembers.

As at Goose, I filed the flight plan the evening before and scheduled the weather brief for 0700 hours. All of the aircraft commanders were present for this brief and we heard the most thorough weather briefing ever given to Army aviators. But as it happened, not at all accurate.

The flight was airborne at 0900 hours on 13 August. Shortly after takeoff we had to cross 8,500-foot mountains and the icecap. We had

little difficulty with the climb but the aircraft had little torque left to spare.

Crossing the icecap was a first for everyone on the mission. The icecap is bound on either side by rugged mountains. Once above it, the icecap appears to be a smooth landing area. There is no telling how hard the crust is or how deep the snow is but from 9,500 feet it looks like a satisfactory landing area.

Soon the long awaited and talked about icecap crossing was over, but soon to be done again. About 50 miles off the coast of Eastern Greenland we started to run into a low ceiling and rain showers with poor visibility. With the forecast we had received I thought it was just a small cell and that we could fly around it. We proceeded on a heading of 120 degrees to avoid the cell, which naturally took us off course. After flying about 100 miles, we were still off course and could not find a break in the weather.

A check up to 10,000 feet was made, but there was still no relief from weather. About 150 miles out over the ocean I directed the flight to turn back to Greenland. Meanwhile the weather forecaster, after receiving a satellite picture, knew we would return. He told us that there was a *large* low pressure cell located right on our flight route between Greenland and Iceland. We had been flying along the edge of it—and it was solid all the way up toward Iceland.

We used the weather day for maintenance. The maximum gross weight flying we had been doing wears bearings much faster than normal. One Chinook had to have several pitch change links changed. The next day found us still down—for both maintenance and weather.

We enjoyed the 2 days in Greenland, and some of the crew worked in a swim in the iceberg-filled Fjord. Naturally, they were testing their survival suits in the 40-degree Fahrenheit water.

On the 15th we were off and flying again. Everyone aboard the CH-47s had become a "professional" at crossing the icecap now.

The weather into Keflavik, Iceland was generally good. There were scattered rain showers, some overcast, but pretty good visibility. Another C-130 Duck Butt, this one out of Keflavik, met us about halfway and flew a hundred or so miles with us. This crew did not pick an orbit point, but joined the flight to make four CH-47Cs and two C-130s.

The flight and landing at Keflavik was uneventful. Navy operations there parked the aircraft on the hot cargo pad about 2 miles from base operations. It was cold and well after dark before the last crewmember finished on the flight line. By the time all the flight planning was completed, and everyone fed, it was 1 o'clock the next morning—and we were scheduled to depart that afternoon. But as it turned out the oil samples were not analyzed and the weather was doubtful. We postponed departure until the 17th when we did get off early heading for Lossimouth, Scotland. The weather forecast en route was fair with several rain showers and a few thunderstorms possible. The forecast for our destination was VFR, but with intermittent conditions of 400 overcast and a half-mile visibility with rain showers.

En Route **Upper Left: At Harrisburg. Lower Left: CW3 Larsen at Goose Bay. Upper Right: Passing sunken ship as approaching Greenland. Center Right: Refueling in Greenland. Lower Right: Departing Iceland**

En route weather again was not as forecast, but at least this time it was much better. The weather was virtually clear to Prestwick, Scotland. About an hour and a half out from Lossimouth we checked their current conditions and forecast. They were down with 400 overcast and a half-mile visibility, so we opted for our alternate at Prestwick. This flight was the longest leg of Operation Northern Leap.

At Prestwick we refueled the main tanks and were off again for Mildenhall, England where we were to spend the weekend. We arrived at Mildenhall right at dark. It had been a long day and everyone was looking forward to enjoying the first real rest and relaxation of the flight.

For all practical purposes the self-deployment concept was complete. After crossing the Atlantic Ocean

the Last Leg **Above: At Mildenhall, England CW3 Walter Fox at base operation. Below: Landing at Heidelberg**

Congratulations **General Frederic J. Kroesen (left), Commander In Chief, USAREUR/Seventh Army and Commander CENTAG-NATO, shakes hands with Captain (P) Steve Gilbertson, Operation Northern Leap Airmission Commander, during welcoming ceremonies last August at Heidelberg, Germany. Each of the U.S. crewmembers of Operation Northern Leap was awarded the Air Medal**

the short flight across the English Channel was nothing. All of the aircraft had held up well. Everyone, I think, was surprised and well satisfied with the CH-47C and the minimum maintenance we had to perform en route.

We all enjoyed the weekend, and Monday rolled around too fast. We filed IFR into Heidelberg, Germany and took off so that we could arrive there at 1400 hours. One aircraft had an engine chip light while taxiing out. This caused only a short delay and we soon were on our way—flying the final leg of Operation Northern Leap. All aircraft were given an ASR approach into Heidelberg and soon the band was playing and we were being welcomed to Germany. It was a memorable day—20 August 1979.

General Frederic J. Kroesen, who is Commander In Chief USAREUR/Seventh Army and Commander, CENTAG-NATO, awarded the Air Medal to the U.S. crewmembers. This was the first time, we understand, that the Air Medal had been awarded during peacetime. We spent about 2 hours at Heidelberg talking with VIPs, the press and interested people. Then we cranked the aircraft and flew to Mannheim, Germany. It was the final part of the mission that these aircraft would be flown by our crews.

Everyone was happy to have the mission successfully completed. All had a feeling they had accomplished something as a group and they felt a lot of self-satisfaction as individuals.

Frequently I am asked what I would change if I was to fly the route again. The most important change would be to schedule all over the water takeoffs around the receipt of the satellite picture. *Wait until the satellite picture is in. Review it and then make the weather decision. No one knows or can forecast what the Atlantic holds for weather at our altitudes. Not one forecast received for any of the three overwater legs was accurate.*

The next change I would make is to *fly longer legs and plan the following day to stand-down.*

During the flight we maintained crew integrity by keeping the same people with the same aircraft for the entire trip. The only exception to this was the three evaluators who switched aircraft after each leg.

The flight flew formation the entire route. It was not a close formation, but we kept all aircraft in sight.

I look back on the mission, and I am pleased. I think it was a true success. Operation Northern Leap proved self-deployability. The CH-47C/D is a self-deployable aircraft.

The future holds more self-deployment missions. I can visualize a medium lift helicopter company that may be scheduled for Europe to fly at least a portion of its assigned aircraft overseas. I believe CH-47C/Ds also will lead the way along the southern route to Europe. I foresee the CH-47C/D accompanying other self-deployable helicopters—the UH-60 Black Hawk and the AH-64 advanced attack helicopter.

Self-deployment, now a reality, is here to stay!

U.S. ARMY
AVIATION STANDARDIZATION

Directorate of Evaluation/Standardization

REPORT TO THE FIELD

DES welcomes your inquiries and requests to focus attention on an area of major importance. Write to us at: Commander, U.S. Army Aviation Center, ATTN: ATZQ-ES, Ft. Rucker, AL 36362; or call us at AUTOVON 558-3504 or commercial 205-255-3504. After duty hours call Fort Rucker Hot Line, AUTOVON 558-6487 or commercial 205-255-6487 and leave a message

Twin Engine Aircraft — Single Engine Operation

ARMY AVIATION'S experience with twin engine aircraft operation has been quite satisfactory. In general, Army twin engine aircraft operators are the most experienced aviators in Army aviation. They have been given instructions in procedures to take following engine failure. They know that flight can be continued with the remaining engine, assuming that the aircraft is being operated within its design limitations.

If the aviator is unable to maintain flight with one engine inoperative, it is most likely because the aircraft design limitations have been ignored, or the aviator has applied techniques in contravention to standardized procedures and has thus produced unsatisfactory flight characteristics.

With this in mind, let us analyze the factors and forces that act on a twin engine aircraft when it must be operated on a single engine.

The asymmetrical power condition which results when an engine fails can produce critical control requirements. First consideration is the yawing moment produced by the asymmetrical power condition. Adequate directional control will be available only when the airplane speed is greater than the minimum directional control speed. Thus the pilot must ensure that the flight speed never falls below the minimum directional control speed because the application of maximum power on the functioning powerplant will produce an uncontrollable yaw if adequate directional control is unavailable.

A second consideration involves the rolling moment caused by the slipstream velocity. Asymmetrical power on the propeller airplane will create a dissymetry of the slipstream velocities on the wing and create rolling moments which must be controlled. These slipstream induced rolling moments will be greatest at high power and low velocity and the pilot must be sure of adequate lateral control, especially for the crosswind landing.

Yaw—Loss of power on one engine also creates yaw due to asymmetrical thrust. Yaw forces must be balanced with the rudder (see figure 1).

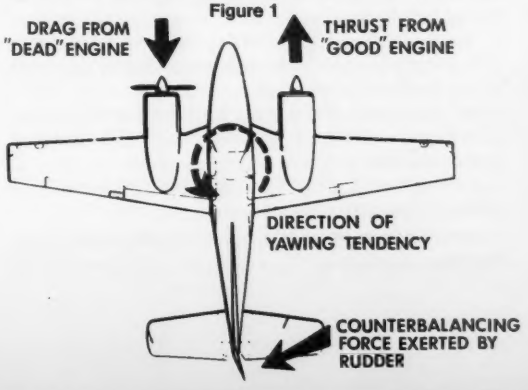
Roll—Loss of power on one engine reduces prop wash over the wing. Yaw also affects the lift distribution over the wing causing a roll toward the "dead" engine (see figure 1). These roll forces may be balanced by banking into the operating engine.

The inoperative engine may contribute additional drag, and the pilot must ensure that the additional drag is held to a minimum. In a propeller-powered airplane, the propeller must be feathered, as the increased drag will detract considerably from the performance. The lower available thrust will reduce the maximum level flight speed, but of greater importance is the reduction in excess thrust. Since the acceleration and climb performance is a function of the excess thrust and power, the failure of a powerplant will be most immediately felt in this area of performance. Loss of one-half the maximum available thrust will reduce thrust to less than half the original value. Thus, critical conditions exist in high gross weight and high density altitude (and high temperatures in the case of the turbine powered airplane) situations.

When critical conditions exist due to failure of an engine, the pilot must consider the reduced excess thrust and operate the airplane within specific limitations. Safe flight with one engine out requires an understanding of the basic aerodynamics involved—as well as proficiency in engine-out procedures.

Basic single engine procedures. Know and follow, to the letter, the single engine emergency procedures specified in your Pilot's Operating Handbook for your specific make and model airplane. However, the basic

Figure 1



fundamentals of all the procedures are as follows:

- Maintain aircraft control and airspeed at all times. This is cardinal rule number one.
- Usually, apply maximum power to the operating engine. However, if the engine failure occurs during cruise or in a steep turn, you may elect to use only enough power to maintain a safe speed and altitude. If the failure occurs on final approach, use power only as necessary to complete the landing.
- Reduce drag to an absolute minimum.
- Secure the failed engine and related subsystems.

The first three steps should be done promptly and from memory. The checklist should then be consulted to be sure that the inoperative engine is secured.

In the case of engine failure immediately after takeoff, it is important to maintain airspeed in excess of the minimum directional control airspeed and accelerate to the best climb speed. After engine failure it will be advisable to climb only as necessary to clear obstacles until the airplane reaches the best climb speed. Of course, the landing gear should be retracted as soon as the airplane is airborne to reduce parasite drag and, in the case of the propeller powered airplane, it is imperative that the wind-milling propeller be feathered. The flaps, if used for takeoff, should be retracted only as rapidly as the increase in airspeed will allow.

Loss of power on one side. Loss of power from one engine affects both climb performance and controllability of any multiengine aircraft.

Climb performance. Climb performance depends on an excess of power over that required for level flight. Loss of power from one engine obviously represents a 50 percent loss of power but, in virtually all light twins, climb performance is reduced by at least 80 percent (see figure 2).

The amount of power required for level flight depends on how much drag must be "overcome" to sustain level flight. It's obvious that if drag is increased because the gear and flaps are down and the prop wind-milling, more power will be required. Not so obvious, however, is the fact that drag also increases as the square of the airspeed while power required to maintain that speed increases as the cube of the airspeed (see figure 3).

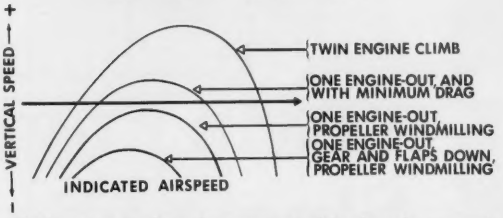
Thus, climb performance depends on four factors:

- Airspeed—too little or too much will decrease climb performance.
- Drag—gear, flaps, cowl flaps, prop and speed.
- Power—amount available in excess of that needed for level flight.
- Weight—passengers, baggage and fuel load greatly affect climb performance.

Best single engine angle-of-climb airspeed (V_{xse}). V_{xse} is used only to clear obstructions during initial climb-out as it gives the greatest altitude gain per unit of horizontal distance. It provides less engine cooling and requires more rudder control than V_{yse}.

Figure 2

Effect of one engine-out and airplane configuration on vertical speed



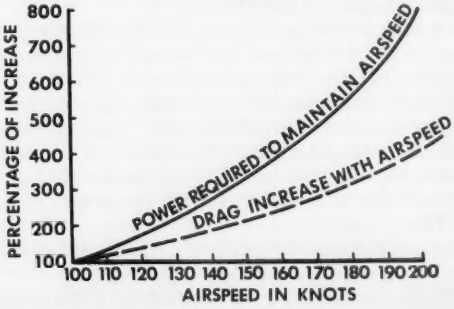
Best single engine rate-of-climb speed (V_{yse}). V_{yse} is designated by the blue radial on the airspeed indicator. V_{yse} delivers the greatest gain in altitude in the shortest possible time and is based on the following criteria:

- Critical engine inoperative and its propeller in the minimum drag position.
- Operating engine set at not more than maximum continuous power.
- Landing gear retracted.
- Wing flaps in the most favorable (i.e., best lift/drag ratio) position.
- Cowl flaps as required for engine cooling.
- Airplane flown at recommended bank angle.

Drag caused by a wind-milling propeller, extended landing gear or flaps in the landing position will severely degrade or destroy single engine climb performance. Single engine climb performance varies widely with type of airplane, weight, temperature, altitude and airplane configuration. The climb gradient (altitude gain or loss per mile) may be marginal—or even negative—under some conditions. Study the Pilot's Operating Handbook for your specific airplane and know what performance to expect with one engine out.

Figure 3

Effect of airspeed on drag—and power required to maintain that airspeed while in level flight



Remember, the Federal Aviation Regulations do not require any single engine climb performance for light twins that weigh 6,000 pounds or less and that have a stall speed of 61 knots or less.

The effect of an engine failure on range and endurance is specific to airplane type and configuration. If an engine fails during cruise, there will be a significant loss of range only if the maximum range condition cannot be sustained with the remaining engine operating within the cruise power rating. If a power greater than the maximum cruise rating is necessary to sustain cruise, the specific fuel consumption increases and causes a reduction of range. Essentially the same relationship exists regarding maximum endurance.

Single engine service ceiling. The single engine service ceiling is the maximum altitude at which an airplane will climb, at a rate of at least 50 feet per minute in smooth air, with one engine feathered. New handbooks show service ceiling as a function of weight, pressure altitude and temperature, while the old flight manuals frequently use density altitude.

The single engine service ceiling chart should be used during flight planning to determine whether the airplane, as loaded, can maintain the minimum en route altitude (MEA) if IFR, or terrain clearance if VFR, following an engine failure.

If the engine-out performance of the airplane is marginal, the pilot must be aware of the very detrimental effect of steep turns. Due to the increased load factor in a coordinated turn, there will be an increase in stall speed and, of greater importance to engine-out performance, an increase in induced drag. Figure 4 illustrates the effect of bank angle on stall speed and induced drag.

The basic relationship expressed by the table is that as the angle of bank increases, load factor induced drag and stall speed increase significantly. The table of values illustrates the fact that coordinated turns with less than 15 degrees of bank cause no appreciable effect on stall speed or induced drag. However, note that 30 degrees of bank will increase the induced drag by 33.3 percent. Under critical conditions, such an increase in induced drag (and, hence, total drag) would be prohibitive causing the airplane to descend rather than climb. Whenever engine failure produces critical performance conditions, it is wise to limit all turns to 15 degrees of bank wherever possible.

Figure 4

Effect Of Bank Angle On Stall Speed And Induced Drag

Bank angle in degrees	Load factor	Percent increase in stall speed	Percent increase in induced drag (at constant velocity)
0	1.0000	0	0
5	1.0038	0.2	0.8
10	1.0154	0.7	3.1
15	1.0353	1.7	7.2
20	1.0642	3.2	13.3
25	1.1034	5.0	21.7
30	1.1547	7.5	33.3
35	1.2208	10.5	49.0
40	1.3054	14.3	70.4
45	1.4142	18.9	100.0
60	2.000	41.4	300.0

Another factor to consider in turning flight is the effect of sideslip or skid. If the turn is not coordinated to hold sideslip or skid to a minimum, additional drag will be incurred. Additionally, the use of the flaps and landing gear can greatly affect the performance of the multiengine airplane when a powerplant is inoperative, since the extension of the landing gear and flaps increases the parasite drag, maximum performance of the airplane will be obtained with airplane in the clean configuration. In certain critical conditions, the extension of the landing gear and full flaps may create a limited amount of thrust at any speed and cause the airplane to descend. Judicious use of the flaps and landing gear is necessary in the case of an engine failure.

During landing with an engine inoperative, the same fundamental precautions must be observed as during takeoff, i.e., minimum directional control speed must be maintained (or exceeded), no steep turns should be attempted, and the extension of the flaps and landing gear must be well planned. In the case of a critical power condition, it may be necessary to delay the extension of the landing gear and extension to full flaps until a successful landing is assured. If a go-around is necessary, maximum performance will be obtained by cleaning up the airplane and accelerating to the best climb speed before attempting any gain in altitude. At all times during flight with an engine inoperative, the pilot must use the proper techniques for control of airspeed and altitude in the condition of steady flight. Power is the primary control of airspeed; pitch is the primary control of altitude; and a coordinated use of power and pitch is necessary to control rate of climb or descent. For example, if during approach to landing the extension of full flaps and landing gear creates a deficiency of power at all speeds, the airplane will be committed to descent. If the approach is not planned properly and the airplane sinks below the desired glide path, an increase in angle of attack will only allow the airplane to fly more slowly and descend more rapidly. An attempt to hold altitude by increased angle of attack when a power deficiency exists only causes a continued loss of airspeed. Proper procedures and techniques are an absolute necessity for safe flight when an engine failure occurs.

The Claw Of The Bear

THREAT

Major Frank Babiasz
and
Captain Carl E. Daschke
Threat Branch
Directorate of Combat Developments
Fort Rucker, AL

THE ONLY TIME that a tank will be a threat to me and my Cobra is if it drives over me while I'm topping-off."

"A tank is a tank . . . seen one, you've seen 'em all."

"A tank can't see . . . if he does he won't be able to hit me anyway . . . right?"

"A tank is going to be too busy doing his thing to worry about me."

If the preceding statements reflect your opinion about Soviet main battle tanks—read on.

The tank, including those of the Soviets and its Warsaw Pact allies, is considered to be the mainstay of the combat battle formation. Army aviation acknowledged this fact years ago, resulting in the need for an antitank helicopter. This challenge has been met with the introduction of the AH-1 Cobra and development of the advanced attack helicopter. Of course we consider threat antiaircraft systems such as antiaircraft artillery and surface to air missiles

MONTHLY WRITING AWARD

T-64

in our tactics: however, have we lost sight that the tank itself could be the most dangerous threat to attack and scout helicopters on the battlefield? Could it be the hunter has become the hunted?

The Soviets are assuredly well aware of our employment of attack helicopters, and the threat they pose to their armor formations. Is it not safe to assume that the attack helicopter will be a high priority target for *all* systems, not only those dedicated as antiaircraft weapons? We have, in fact, created a rather unique situation which dictates that the attack helicopter must place itself in an extremely vulnerable position for up to 21 seconds each time it engages its armor targets.

The situation is made even more grave by the fact that the tank is seldom, if ever, employed singularly. Most engagements by the Cobra will be directed towards platoon and company-sized armor formations. This means that while the Cobra is exposed, it has a chance of being acquired and engaged by either the targeted tank or another tank from within the armor formation. The tank, then, easily can be considered to be one of the greatest direct threats to the survivability and mission accomplishment of the attack helicopter.

To better understand the threat, let's briefly review the evolution of the tank over the past 25 years.

First, the main battle tank is considered to be the keystone of Soviet offensive actions. The tank is designed to inject shock action, speed and firepower into the offensive operation. Consequently, almost every piece of ground combat hardware is designed and dedicated to complement or protect the armor formations.

Second, the tank is an evolutionary combat system. Every effort has been made to ensure that the Soviet tank incorporates the advancing armor state-of-the-art improvements whenever possible. This is evidenced

MAIN BATTLE TANK COMPARISON

	T-55	T-62	T-64	T-72	T-80
ARMAMENT					
Maingun	100 mm	115 mm	125 mm	125 mm	125 mm
Coax Machinegun	7.62	7.62	7.62	7.62	7.62
AAA Machinegun	12.7*	12.7*	12.7	12.7	12.7/14/5
DIMENSIONS					
Weight	36	36.5M	38	41	45
Height	2.25M	2.4M	2.26M	2.3M	2.3
Length	6.4M	9.5M	9.02M	9.24M	7.0
Width	3.27M	4.0M	3.375M	3.49M	3.5
MAXIMUM SPEEDS					
Road	50 Kmph	50 Kmph	85 Kmph	100 Kmph	70
X Country	?	?	60 Kmph	60 Kmph	?
CRUISING RANGE					
Minimum	400	400 KM	450 KM	450 KM	450
W/Aux Fuel	600 KM	600 KM	600 KM	600 KM	650
Basic load	34-43	40	40	40	40
NBC		yes	yes	yes	yes
Crew	4	4	3	3	3

*Every model not equipped with AAA MG.

T-55

T-62

by the fact that during the past 25 years the Soviets have developed and fielded the T-55, T-62, T-64 and T-72 medium tanks, each of which demonstrates improvements in armament, mobility and armor protection over its predecessor. (In addition to the fielded systems, it also must be recognized that numerous other tanks were developed by the design bureau, but for unknown reasons, were never fielded with the Soviet armor units.)

In the past, many of us have considered the Soviet tank to be inferior to its U.S. counterpart. The idea that the Soviets preferred quantity over quality was an often-expressed opinion of the U.S. military. Fortunately, the 1973 Mideast War served as the catalyst to change many of our thoughts concerning Soviet armor. It was determined, for example, that the T-62 has a far more accurate maingun than originally was believed, and the fire control is better than was expected. Soviet armor has most probably been developed against several design criteria:

Out-gun the Opponent. A quick comparison of the T-55 through T-72 shows that the T-55 is equipped with a 100 millimeter (mm) smooth bore maingun, with the T-62 fielded with a 115 mm gun, and both the T-64 and T-72 tanks armed with 125 mm mainguns. This fact is compared to the smaller calibered U.S. tanks M-48 (90 mm) and M-60 (105 mm). The Soviets have maintained over the years that the fin-stabilized projectile, fired from a smooth bore gun, is more accurate while maintaining a greater tube life than its rifle bore counterpart.

Armor Protection. The frontal armor has improved with the introduction of each new main battle tank. For example, the older T-55 has up to 100 mm of frontal hull armor, while the newer tanks possess the equivalent of several times the T-55's armor plating. This upgrading was necessary to counter the more sophisticated antitank systems being fielded by the NATO armies.

Mobility. Although the weight of the tanks has steadily increased with each new acquisition (T-55/36 tons, T-72/41 tons), the Soviet planners have maintained a favorable weight/power ratio designed to achieve a high mobility capacity. Furthermore, while the tonnage of the tank has increased its size, the silhouette has in fact decreased since the T-62 was fielded.

Thus, we find that today's Soviet tank is a heavily gunned, mobile system which has been designed to operate effectively in a variety of geographic locations (Central Europe, Middle East, etc.).

Helicopter Engagement Techniques. Helicopters, with little or no armor plating, are highly vulnerable to the tank's 7.62 coaxial mounted machinegun; the antiaircraft machinegun mounted on the commander's cupola; and the maingun of 100, 115 or 125 mm. The most devastating, or course, is the maingun, which fires an assortment of lethal munitions. If possible, the tanks will use fragmentation rounds with time fuses when engaging helicopters. However, in the heat of battle one can expect to be engaged with whatever is in the chamber. Airborne targets normally are detected by designated "air spotters" strategically placed in the formation. The target information is given to the commanding officer who will determine priority targets. Stationary helicopters (hovering or on the ground) or aircraft flying in a head-on direction, normally are fired upon by direct fire. This is the same tactic which the tank employs against ground targets. This requires the tank crew to accomplish the following steps:

(1) target position fix
(2) firing order
(3) set time-fuse and load gun
(4) set sight
(5) take aim and fire

Although this seems like a lengthy process, an efficient tank crew can bring effective fire on hovering helicopters within a matter of seconds. When possible, helicopters will be fired upon by a subunit of tanks (platoon, company), using a barrage technique, to ensure higher kill probability. Although attack and scout helicopters will try to maintain maximum stand-off range, there undoubtedly will be numerous engagements within range of the tanks multiple weapon systems.

There is no doubt that the helicopter will be a significant factor in future battles, particularly those with a high density of armor. The Soviets recognize this and are preparing to meet the challenge. A recent open source Warsaw Pact document noted that "combat operations directed against helicopters have to be conducted *not only by antiaircraft defense troops,* but also by troops from other armed forces branches and services equipped with other kinds of weapons."

The bottom line is that the tank *will* engage helicopters and the lethality of its weapons, excellent armor protection, mobility and sheer numbers makes it a major antihelicopter threat on the modern battlefield.

STORAGE IDEA SAVES MONEY

Dean Fletcher
Public Affairs Office
101st Airborne Division (Air Assault)
Fort Campbell, KY

WHILE RIDING around Ft. Campbell in a truck one day recently, 1LT Michael Frisina thought of an idea that will save the U.S. Government more than $2,000.

Lieutenant Frisina, medical platoon leader with the 2nd Squadron, 17th Cavalry, 101st Airborne Division, thought of a way for the airfields and motorpools to store their petroleum, oil and lubricants (POL) products without having to build new storage facilities.

"The Environmental Protection Agency came out with a policy a couple of years ago saying that in the event of a spillage of waste oil and stored petroleum products, the spillage had to be contained in some way. We were 'gigged' for not having these storage facilities during an Inspector General's inspection this summer," Lieutenant Frisina said.

After learning that the facilities to store the waste oil products had to be built, Lieutenant Frisina and his squadron built a storage facility at the squadron motorpool using self-help supply material at a cost of only about $600.

"One day the squadron safety officer, CPT Mac Jones, and I were riding around post. We were trying to think of an easier and less expensive way to come up with the storage facilities. We saw some old abandoned coal bins and thought that if we could move them they would make excellent storage buildings for our waste oil products."

The attempt to move the coal bins has worked out successfully for the 2nd Squadron 17th Cav. "It costs us about $85 to cement in the fourth side and to put a roof on them. We save the Government something like $600 every time we move one of the old bins," explained Lieutenant Frisina.

Thus far the unit has moved four of the bins and plans to move nine more.

Photos by Dean Fletcher

LT Frisina and SGT Cargile, 29th Trans Bn, discuss how to move one of the coal bins (left). LT Frisina and CPT Jones inspect a bin (above). SGT Cargile and SGT Bennett of 20th Engr Bn move an old bin (below)

U.S. Army Training Extension Course . . .

After 5 Years In Operation

Major Charles F. Hanselmann and **Jerry Perlman**
Training Extension Course Division
U.S. Army Training Support Center
Fort Eustis, VA

IN 1971 THE U.S. Army Board for Dynamic Training, later redesignated as the U.S. Army Combat Arms Training Board, identified a critical need for a type of instruction which gears itself to the needs of the individual Soldiers after they have finished their initial formal military training. After 3 years of research and development by U.S. Army Training and Doctrine Command to initiate more effective and useful ways to train individuals, the training extension course (TEC) program was introduced in 1974.

TEC lessons originally were designed to assist in upgrading and maintaining military occupational specialty (MOS) skill proficiency for combat arms Soldiers. They are prepared by the service schools to train individuals in the active Army, Reserve Components and Army related activities such as the Reserve Officers' Training Corps. TEC is an alternative to traditional group instruction where the Soldier is required to participate regardless of qualifications and knowledge. The philosophy of performance oriented training, training objectives, using standard go/no-go testing, and validated lesson development is part of the overall TEC system. TEC is a vehicle for communicating critical "how to" principles, techniques and methods of MOS/job performance training while providing validated materials to train both individual Soldiers and units.

TEC is closely integrated with and supports the Enlisted Personnel Management System, the Soldier's Manuals, skill qualification tests (SQT) and the Army Training Evaluation Program.

During the lesson development process each TEC lesson is tested (validated) using Soldiers from the lesson's target audience (i.e. Soldiers skilled in the actual MOS are used during validation to test the effectiveness of the lesson). If members of the test group fail the pretest, then take the lesson and fail the post test, the lesson is redesigned and retested until a representative sample of the target group can achieve the objectives of the lesson as indicated by passing the post test.

The first step for a Soldier in taking a TEC lesson is reading the lesson administrative instructions (LAI). The LAI outlines objectives of the lesson, skills required to take the lesson and provides the pretest. The student instruction sheet included with the lesson states objectives, materials needed and time required. TEC lessons are standardized. A TEC pretest is designed to reveal a Soldier's proficiency or lack of proficiency in the appropriate MOS. TEC tests are conducted under real world situations to give the noncommissioned officer or officer a tool to measure the degree of Soldier proficiency or unit proficiency and to prescribe appropriate training where applicable. If Soldiers can pass the pretest they can proceed to more advanced training without taking that particular lesson.

TEC lessons are prepackaged, Soldier-tested for the critical tasks connected with MOS. TEC employs the latest developments in educational technology: empirical design (based on experience or observation instead of theory), "hands-on" performance, lesson validation trials and various methods of media delivery or lesson format (e.g. printed, audiovisual and audiotape).

Most TEC lessons are presented in audiovisual format using the Beseler Cue/See (Q/C) projector. This projector uses an 8 millimeter film packaged in an endless film loop cartridge with an accompanying standard audiotape in a separate cassette. The film and sound are programed to stop automatically to permit the student to answer questions or perform a task; then the student can reactivate the lesson by pressing a "proceed" button. All TEC equipment can be powered by a standard field generator and transported in protective carrying cases. The Q/C can be used by one Soldier at a time (with or without earphones) or a small group of 2 to 15 Soldiers. TEC hardware works well with 10 kilowatt or higher a.c. generator power. Eight Beseler Cue/See machines normally are issued to each battalion size unit with lesser amounts to separate companies or detachments. It costs abut $7,800 to develop a TEC lesson and each copy costs about $3.

Lessons which are more appropriate for use in a field or motor pool situation (i.e. hands-on training) are developed in audiotape format. Soldiers can listen to the tape on a standard portable cassette player as it

TRAINING EXTENSION COURSE

TEC is the sure way any soldier can learn. There are TEC lessons for almost every MOS (Military Occupational Specialty). NCOs can use TEC to train one soldier or a group of soldiers at their own pace. Repeat a lesson if necessary. TEC will improve chances for higher SQT scores, promotions and more pay. Ask your CO or NCOIC about TEC (Training Extension Course).

LESSONS AVAILABLE NOW:

40 LESSONS

AVIATION SCHOOL

Map Interpretation, Corridor Orientation, Hourly Weather Sequence Reports, Inspection Guides, Terminal Weather Forecasts, Terrain Analysis, Dispatching VFR Flights, Forms and Records, Install a Hydraulic Servo Actuator, Remove and Inspect, etc . . .

25 LESSONS

CHAPLAIN SCHOOL

Chaplain Fund-Accounting for Receipts, Chapel Management, Issuing Equipment and Inventorying Property, Monitor Supply Needs of Chapel, Preparation of Altar for Catholic, Protestant Services, Preparation for Jewish Field Service, etc.

76 LESSONS

ENGINEER SCHOOL

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127 LESSONS

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Preventive Maintenance TA 50-900, Wheeled Vehicle Recovery Operation, Varied Terrain Driving, Reduced Traction and Hazards, Preparation for Towing, Operation of 5-ton Truck, Armored Vehicle Recognition, Introduction to, etc . . .

221 LESSONS

FIELD ARTILLERY

Determination of Direction, Locate a Target by Shift From A Known Point; Cover, Camouflage & Concealment, Electronic Early Warning Devices, Field Wire Installation, Test of the, etc . . .

17 LESSONS

MILITARY POLICE SCHOOL

Clear the Crime Scene, Process the Crime Scene, Call the Desk Sergeant, Release the Crime Scene, Collect Evidence, Mark Evidence, Interview: Introduction, Identify People by Type, Select Best Source, Conduct the Interview, Rights Warning Procedure, etc . . .

157 LESSONS

INFANTRY SCHOOL

The Hand Grenade, Operating the LAW, Loading and Unloading the M16A1 Rifle, Introduction to land Navigation, Determine Distance While Moving, Navigation with Maps & Compass, Bypass Obstacles Using Detour Method

20 LESSONS

INTELLIGENCE SCHOOL

Introduction to AN/PPS-4A and AN/PPS-5 and 5A Radar, Installation, Operator Checks and Adjustments, Telescope Alignment, Orient, Stop Proc, Disassembly, Troubleshooting to the System Level, Testing the Radar Set AN/PPS-4A, etc . . .

77 LESSONS

ORDNANCE SCHOOL

M60A2 Tank Turret, Testing Main Weapons System Using Test Set M551, Multifuel Engine Fuel System, CD850 Transmission, Preparing and Maintaining DA Form 2400, Troubleshooting the Service Light System, Clutches, Steering, etc . . .

50 LESSONS

DEFENSE LANGUAGE

Plan and Prepare, Question of the Guard, Approach Phase, Composition-Organization, Composition-Strength, Disposition and Map Tracking, Logistics-Weapons and Ammunition, Termination Phase, Miscellaneous-Tactics & Training, Obstacles, Losses, etc.

88 LESSONS

MISSILE MUNITIONS

How to Repair the TOW Launch Tube, How to Get Your Bullets, Ammunition Color Codes, How to Prepare an Electric Firing System, Quantity Distance & Compatability, Direct Loading of a Milvan, Store Ammunition Under Combat Conditions, Requisition, etc . . .

149 LESSONS

AIR DEFENSE

Chaparral/Vulcan Tactics RSOP, Gama Goat Checks & Services, Basic First Aid Measures, Burns & Eye Injuries, Cold Weather Hazards, Vulcan Cannon Inspection, Lubrication & Assembly, Improved Hawk Load & Unload, Missile Transfer

60 LESSONS

QUARTERMASTER SCHOOL

Item Identification, Preparing Material for Shipment, Issue Supplies, Process Incoming Supplies, Editing Requests for Authorization, Requesting High Priority Item, Performing Monthly Summaries, M2 Burner Unit: PM, M59 Field Range, etc . . .

13 LESSONS

TRANSPORTATION SCHOOL

Preparing Travel Itineraries, Comparing Travel Costs to Select Mode, Preparing MAC Transportation Services, Preparing a Report of Shipment, Tallying Cargo Onto Transport Equipment, Determining Cargo Compatiability & Selecting Codes, Preparing a U.S. Government

175 LESSONS

SIGNAL SCHOOL

Basic International Morse Code, Radio Wire Integration Installation, Calling and Answering, Establsihing a Net, Message Format, Transmission Instruction, Verifications and Acknowledgements, Radio-teletypewriter Procedures, etc . . .

55 LESSONS

USA INTELLIGENCE

VHF/UHF/SHF: Search & Signal Identification, Computing Decibel (DB) Values, Tuning Jammer, Modulation & Keying AN/TLQ-15, Time Domain Reflectometer Test (TDR), Voltage Standing Wave Ration Test (VSWR), Computing Systematic Error & Standard Deviation

49 LESSONS

ADMINCEN

Mailable Articles, Insured Mail, Preparing a Duty Roster, Determine Duty Status Codes, Maintain the Unit Manning Report, Process DA Form 31, Prepare A Sidpers Change Report, Posting DA Publications, Requisitioning Blank Forms for Local Purs Stock Room, etc.

3 LESSONS

ACADEMY OF HEALTH SCIENCES

Initiating & Completing the Field Medical Card, Identify & Control Health Related Orthropods, Locate and Request Medical Supplies from FSC, and more to come . . .

"talks them through" the lesson.

A third form of TEC lesson material is the programed text. This is usually a soft cover booklet with administrative instructions outlining the objective, materials needed, time required, references and other pertinent information. Often the text is illustrated. Each printed lesson contains instructions, questions and answers in step-by-step format.

All TEC lessons are self-paced. Soldiers are able to learn at their own pace with any form of media. TEC lessons are designed to be given under field conditions. The lesson can be taken almost anywhere in the field as time permits. TEC lessons may be used during duty hours, nonduty hours or any combination of both. TEC lessons are ideal for make-up or equivalent training or split drills. The lessons can be reviewed while waiting at the rifle range or in a truck or a tent or in connection with on-the-job training.

TEC helps Soldiers prepare for their SQT. Critical tasks required for the individual's MOS proficiency are in the Soldier's Manual. TEC lessons mentioned in the manual will help the Soldier achieve the desired level of proficiency. Each TEC lesson is designed to train a Soldier to perform critical job tasks. TEC is used in basic and advanced individual and unit training and has in many instances replaced the huge classroom full of sleepy Soldiers with an interesting, interactive, challenging alternative to training.

Instructors can give a high level of training without being an expert in every subject. A squad leader with minimum advance preparation can use a TEC lesson as a training aid by stopping the lesson to ask questions or discuss major points. TEC reduces the instructor preparation time and increases management responsibility.

Experienced Soldiers may complete a TEC lesson in 30 minutes and others may require longer, but time is unimportant if the Soldier can pass the test. TEC lessons can be repeated as often as necessary to ensure the correct level of mastery is achieved or as refresher training. After reviewing the TEC lesson Soldiers are post tested to determine their skills in their respective MOSs. They also may study other MOS lessons if interested. Each lesson must be mastered before the Soldiers move on to the next step. The students do not compete with others. TEC deemphasizes failure. If students do not get the right answer the first time, they are encouraged to repeat the process.

A study by the Army Research Institute completed in January 1978 concluded: TEC teaches more effectively than conventional instruction. TEC-trained Soldiers retain what they learn. Eight weeks after TEC instruction they performed better than Soldiers who were tested one day after receiving conventional instruction. During limited evaluation TEC users scored higher on SQT than Soldiers who did not use TEC. Besides being more effective than conventional training, TEC training costs 16 percent less.

TEC gives the most information in the least amount of time, teaching Soldiers to do their jobs better and training them for new skills which increase chances for promotion. Soldiers learn faster, retain longer and have a higher degree of motivation when they control their own rates of progress toward training goals. And, the best training is that which most closely approximates real world conditions. Soldiers who can relate to actual job performance will be motivated and learn better. TEC provides Soldiers clear-cut progression patterns with maximum advancement opportunity throughout their careers.

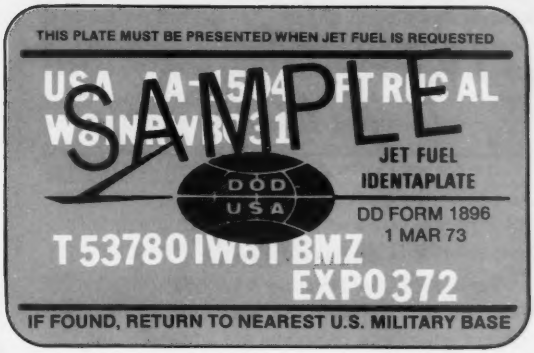
As of 30 September there were more than 1,400 TEC lessons distributed to more than 7,600 active Army and Reserve Component units worldwide. There were more than 29,000 Beseler Cue/See projector machines distributed. The number of lessons available at a given time varies. This is due to revisions, additions and deletions of courses to coincide with changed and updated training requirements. Actual lessons prepared and distributed by each service school as of 30 September 1979 to support proponent MOSs were as shown on the chart, page 19. There also are 182 completed lessons currently under distribution and 3,000 in various stages of production.

According to results of a Military Personnel Center (MILPERCEN) survey of TEC usage completed in February 1979, with 13,789 usable returns, more than 90 percent of combat arms officers are familiar with TEC, as are more than 80 percent of combat arms enlisted personnel. There are 78 percent of the noncombat arms personnel familiar with TEC and more than 80 percent of the noncombat officers. Additional results of the MILPERCEN survey reveal that 40 percent of the combat arms enlisted personnel did not use TEC in the 3 months prior to the survey while 54 percent of the noncombat personnel did not use TEC during the same period. However, results of the last six MILPERCEN surveys, dating back to May 1977, show an increasing awareness of TEC and steadily rising usage—up 75 percent from May 1977 to February 1979 for enlisted noncombat personnel.

There are several reasons why TEC is not being used more often. Some Soldiers surveyed did not know how to use the material or did not consider it important. A surprising number of Soldiers did not know that TEC lessons were available at almost every unit in the Army worldwide, and others do not have access to the lesson during off-duty hours when they want them. A TEC lesson availability list is distributed quarterly to all TEC account holders. The point of contact for obtaining more information about the TEC program is the TEC Production and Distribution Office, AUTOVON 927-4868, Ft. Eustis, VA 23604.

IDENTAPLATES

John Spriggs
U.S. Army General Materiel and Petroleum Activity
New Cumberland, PA



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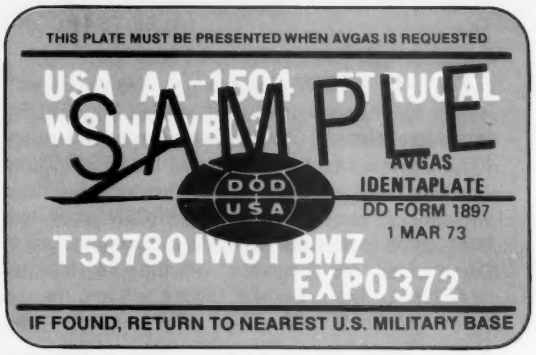


(Purple)

THE DOD JET FUEL Identaplate (DD Form 1896 (white)) and the DOD AVGAS Identaplate (DD Form 1897 (purple)) are to be used by operators to obtain refueling of Army aircraft at Army airfields, other than home stations, at Navy and Air Force installations, and from commercial vendors under Government contract. The National Credit Card (SF-149) *IS NOT* to be used to refuel any type of Army aircraft (except under very special conditions stated in paragraph 3-19 of AR 703-1).

Unfortunately, *many pilots do not use the identaplates,* or they use identaplates that belong to another aircraft, or have been listed as missing or destroyed. All pilots should be familiar with identaplates and be sure to have the correct identaplate in their aircraft with a current DOD activity address code (DODAAC).

When procuring fuel and oil by use of aviation fuel identaplates, operators will ensure that the invoice or delivery slip is prepared *legibly* and lists all necessary data as follows, to enable the responsible agencies to credit the purchase to the account of the contractor concerned—

- Name and address of vendor.
- Date of purchase.
- Brand name or product specification.
- Vehicle or aircraft identification or serial number.
- Quantity, unit price and extended total of each product, commodity or service provided.

Anyone filling out a sales slip for fuel should also be careful in taking the correct info directly from the card. Also, make sure the correct info is on the identaplate. If the plate is in error, confiscate it and return it to U.S. Army General Materiel and Petroleum Activity, New Cumberland Army Depot, New Cumberland, PA 17070.

AR 703-1, Chapter 3, paragraph 3-21, specifies fuel must be obtained from commercial vendor under Government contract as identified in Defense Fuel Supply Center (DFSC) Into-Plane Contract Bulletin.

Reporting Final

Late News From Army Aviation Activities

FROM ST. LOUIS

First Aid Kit, Eye Dressing NSN 6545-00-853-6309 (Gen 79-11). All Army aircrew and aviation life support equipment personnel are advised to inspect the eye dressing kit named above for out of date eye ointment and correct NSN. Information received from the U.S. Army Medical Materiel Activity (USAMMA) identifies the only correct eye ointment which should be found in the eye dressing kit as NSN 6505-00-183-9419, sulfacetamide sodium ophthalmic ointment USP, 10 percent, 1/8 oz. Outdated ointments that may be found in the eye dressing kits are NSN 6505-00-299-8175, sulfacetamide sodium ophthalmic ointment, modified 30 percent or NSN 6505-00-530-6469, bacetracin zinc, neomitcin sulfate and polymixin 9, sulfate, opthalmic ointment. The eye dressing kit is a component of the following standard major unit sets and kits:

- NSN 6546-00-116-1410 first aid kit, general purpose
- NSN 6546-00-168-6893 first aid kit, life raft
- NSN 6546-00-823-8165 first aid kit, individual (used in Army aircraft survival kits)
- NSN 6545-00-919-6650 first aid kit, general purpose/airplane
- NSN 6545-00-922-1200 first aid kit, general purpose rigid case
- NSN 6545-00-927-4925 surgical instrument and supply set, flight nurse

Inspect the eye dressing kit 6505-00-853-6309 as follows: Do not open the eye dressing package, this will render the kit unserviceable. Check the list of contents printed on the eye dressing package. If the correct eye ointment TN 6505-00-183-9419 is not listed, discard the eye dressing kit and replace it with one which has the correct eye ointment. For eye dressing kits with the correct eye ointment inspect the eye ointment tubes by moving them around to a clear place in the package to read the date on the tubes. It should be noted that the eye ointment tubes NSN 6505-00-183-9419 will have a manufactures date (example MFD 6 79) or an expiration date (example 6 79), these dates may be found in any one of three locations:

- On the tube label;
- on the crimp at the bottom of the tube; or,
- on the box which the tubes are packed.

If outdated or incorrect ointments are found in the eye dressing kits, the kits should be removed, destroyed and replaced with eye dressing kits containing the correct eye ointment. New kits should be ordered from units' supply officer using existing supply procedures.

The minimum shelf life for ointment NSN 6505-00-183-9419 is 36 months from date of manufacture; additional information of shelf life medical items may be found in SB-8-75 Army Medical Department Supply Information, which can be ordered from the St Louis AG Publications Center. For more on this matter contact Mr. M.A. Bailey, TSARCOM Aviation Life Support Maintenance Office, AUTOVON 693-3715.

(ALSE-TSARCOM)

FROM WASHINGTON

New MILPERCEN Commander. Major General Robert M. Elton assumed command of MILPERCEN from Major General Charles K. Heiden on 4 January 1980. General Elton, a graduate of the U.S. Military Academy, has served as the Director of Officer Personnel Management at MILPERCEN since late 1978. Prior to that he was the Assistant Division Commander for Logistics of the 3d Infantry (MARNE) Division. General Heiden will assume the position of Commanding General of the U.S. Army Training Center and Ft. Dix on 28 January 1980.

EER Regulation. For the first time in its 20-year history, the Enlisted Evaluation Reporting System has its own regulation. AR 623-205, which became effective 15 January 1980, is the new consolidated regulation that governs the preparation and submission of enlisted evaluation reports. It replaces Chapter 8 of AR 600-200 and DA Pamphlet 623-1.

Information on current policies in the new regulation has been expanded and rewritten to clarify procedures and requirements. The regulation follows the same format as recently revised regulations for the Officer Evaluation Reporting System (AR 623-105) and Academic Evaluation Reporting System (AR 623-11). **(MILPERCEN)**

FROM GERMANY

Transfer of Aviation Training Responsibilities. CINCUSAREUR Heidelberg, Germany, message (25 Jan 80) says that staff proponency for aviation unit

training, aviation ARTEPs and aerial gunnery for units in Germany was transferred from the USAREUR Aviation Division (AEAGC-AV) to the Seventh Army Training Command, Grafenwoehr, Germany. AEAGC-AV will retain primary staff responsibility for aviation individual training. USAREUR POC is LTC Carlin, AEAGC-AV, HDS MIL (2121-) 8065/6587. **(AEAGC-AV)**

FROM FORT BENNING

Hot Line Installation. The U.S. Army Infantry School has instituted a "Hot Line" telephone system open to units worldwide that have questions or comments on the Army Training and Evaluation Program (ARTEP). The new service, put into effect by the Collective Training Branch of the Directorate of Training Developments, will be open 24 hours a day. The "Hot Line" (AUTOVON 835-4759 or Commercial 404-545-4759) supplements existing comment sheets contained in the Trainer-Evaluator portion of ARTEP documents.

Questions or comments concerning ARTEP's 7-15, 7-202, 7-255, 7-500, 57-55 or 71-2 are welcome. Since the recording equipment on the "Hot Line" limits messages to 30 seconds, callers with lengthy questions or comments are asked to leave an AUTOVON number and point of contact for a return call from the Infantry School. Or, questions and comments may be mailed to: Commandant, U.S. Army Infantry School, Ft. Benning, GA, 31905, ATTN: ATSH-I-V-ET. **(USAIC-PIO)**

FROM FORT RUCKER

New Revised AR 95-1. The Aviation communities' latest revision of AR 95-1, "Army Aviation: General Provisions and Flight Regulations," is being distributed and became effective on 1 February 1980. This major revision of AR 95-1 represents a significant improvement over the previous edition by clarifying many problem areas the field was experiencing with the old AR. Worldwide distribution of the new AR will be made through normal distribution channels.

Night Vision Goggles Video Tapes. Worldwide distribution of four new video tapes has been made to active Army and National Guard units and USAR Components by the Tobyhanna Army Depot, Tobyhanna, PA.

Produced by the ETV Division, Directorate of Training Developments, Ft. Rucker, AL, the tapes are titled: "Night Vision Goggles for Aviation Crewmembers: An Introduction to the AN/PVS-5" and are designated as Parts I, II, III and IV.

Topics covered include a display of the goggles and component identification, mounting of the goggles on the helmet, making goggle adjustments in preparation for night flight, changing goggle batteries while wearing the helmet and gloves with goggles mounted, and limitations on operation under varying climatic conditions to include cautions and warnings and goggle functions related to flight conditions.

All four tapes should be viewed together to receive the complete message. The times are: Part I, 10 minutes; Part II, 23 minutes; Part III, 11 minutes, and Part IV, 16 minutes.

Additional copies can be obtained from the Audiovisual Department at Tobyhanna.

(USAAVNC-DTD)

FROM CALIFORNIA

AVRADCOM Briefs. Entering the 1980s the U.S. Army Research and Technology Laboratories (AVRADCOM) has programs in the mill with industry designed to:

- Reduce loss of life and costs in aircraft accidents through improved crashworthiness technology. The program will formulate crashworthy seat energy absorber design criteria for more effective use of available stroking distance, thereby reducing the chance of injury due to occupant crash impact decelerative loading.
- Conduct a reliability and maintainability engineering program called "Advanced Structures Maintenance Concepts" to assure a high degree of R&M characteristics in the ongoing UH-60 Black Hawk. This research effort also will develop maintenance concepts for planned advanced structures concepts for the Black Hawk.
- Investigate the feasibility of applying the SMIDS concept to the XM-65 TOW Guided Missile Subsystem, under a recent Army aviation R&D contract. SMIDS means Standard Maintenance Information and Display System. The program goal was to determine the potential of reducing maintenance problems with the XM-65 TOW subsystem on the AH-1S Cobra.
- Develop thermoplastic composite manufacturing technology to make full-scale flightworthy secondary helicopter structures cheaper than epoxy composite or metalllic counterparts. Selection of the best overall fabrication techniques will be conducted by checking out various forming processes. The initial program effort will review the cost, reliability, maintainability and repairability of a current CH-47 Chinook helicopter secondary component.
- Improve maintenance techniques for Army helicopter engines. Diagnostic and condition monitoring systems for Army helicopter modular turboshaft engines will be assessed.

U.S. ARMY SAFETY CENTER

Among the first things you learn in the Army is respect for the chain of command. If you fail to honor this policy, you are apt to find yourself in hot water. However, there is another "chain"—one associated with aviation safety—that is seldom publicized as such. Yet, it is of such vital importance that should you violate it, you not only may find yourself in trouble but also your very life at stake. So, it is absolutely essential you keep a sharp eye on this all-important "chain" and make certain it contains . . .

NO WEAK LINKS

WE LIVE IN a real world, and try as we may, we cannot escape reality. Yet, as the old saying goes, we don't always see the forest for the trees. Often, we fail to grasp the full significance of all the facts before us. Consequently, we might find it helpful to periodically turn away from reality. Then, on looking back, we may possibly discover insights we had previously missed. So, for a brief moment, let's join in a bit of fantasy.

Picture yourself as an aviation unit commander returning to duty after a long-needed and well deserved vacation. Your spirits are soaring and your step is quick as you weave your way out of the airport terminal to a waiting staff car. As the driver helps you with your luggage, you can't help noticing the immaculate appearance of the vehicle. In fact, you can't remember ever having seen it quite so sparkling clean; and you comment on it.

The driver twists the key in the ignition and eases the car into the line of traffic before he responds with a "Yes, sir, but we sure didn't think we'd ever get it clean—not with all that paint on it."

Somehow you suddenly get the feeling you would have been better off if you had never commented on the car. But it's too late now. Curiosity gets the better of you, and you pursue the matter: "Paint? What paint?"

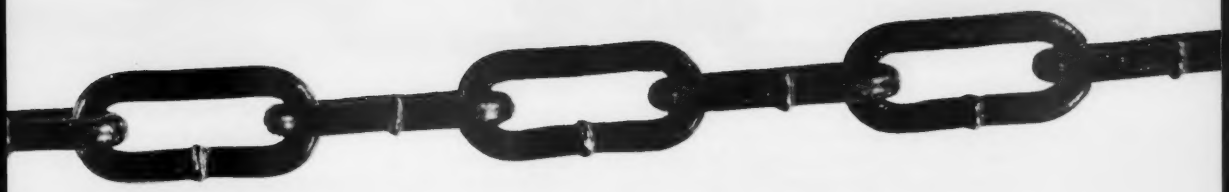
Without taking his eyes off the road, the driver replies: "The paint from the storage shed between the hangar and the parking area."

Impatiently, you inquire further: "Just how did the paint in the storage shed manage to get on the car?"

Casually, the driver answers: "Well, the car was parked in one of the spaces near the shed. After a short pause, he nonchalantly adds: "When the shed exploded, it was only natural that the paint would splatter all over the car—being that close to it."

"Oh, why of course," you want to mimic. "When the shed exploded, it was only natural that the paint would splatter all over the car." But you don't. Instead, you blurt out: "How in the blue blazes did the shed explode?"

"From the fire," the driver quickly replies. "When the shed caught fire, the fumes inside exploded and



paint splattered all over the car. Like to never got it clean."

Momentarily, a feeling of relief passes through you. But it's short-lived. The realization registers that if the shed caught fire and set off the fumes inside, there's got to be more to it. You stutter as you ask, "How—how did the shed catch fire?"

"From the burning embers," comes the reply.

"Burning embers?"

"Yes, sir. Burning embers set the shed on fire."

"What burning embers?" you shout.

"The burning embers from the hangar," he replies.

"Burning embers from the hangar! You mean the hangar caught fire?"

"Yes, sir. Hangar caught fire . . . burning embers from the hangar set the shed on fire . . . fumes inside shed exploded . . . paint splattered all over the car. Like to never got it clean."

You look at the driver somewhat in disbelief. "How did the hangar catch fire?" you ask.

"From the fuel truck beside it. Fuel truck caught fire . . . set fire to hangar . . . burning embers from hangar set shed on fire . . . fumes inside shed exploded . . . paint splattered all over car. Like to never got it clean."

"But how did the fuel truck catch fire?"

"From the electric wires."

"What electric wires?"

"The ones from the transformer to the hangar service inlet box. When they fell across the fuel truck, it was like a bunch of lightning bolts hitting it all over. Fuel truck caught fire . . . set fire to hangar . . . burning embers from hangar set fire to storage shed . . . fumes inside storage shed exploded . . . paint splattered all over car. Like to never got it clean."

"And just what made the wires fall?" you inquire.

"Boom got them."

"Boom? What boom?"

"The boom on the crash truck."

"Crash truck?"

"The one that came to pick up an OV-1 that had a collapsed main gear. I guess the boom was raised up too high, and when the driver tried to move the crash truck in position, the boom accidentally hit the wires. Wires fell on fuel truck . . . fuel truck caught fire . . . set fire to hangar . . . burning embers from hangar set fire to storage shed . . . fumes inside storage shed exploded . . . paint splattered all over car. Like to never got it clean."

"And just what caused the gear on the Mohawk to collapse?" you ask.

"It was on account of all that blooming foam on the hangar apron," the driver replies, then adds: "When the tug driver tried to move the Mohawk out of all that foam, I guess he must have turned too sharp and too fast. Anyway, the plane slid off the apron and the gear hit a fire hydrant. That's when it collapsed."

"What was the foam doing on the apron?" you wonder out loud.

"The firemen put it there."

"No stuff!" you shout facetiously.

"Yes, sir," the driver responds. "The firemen put it there all right—on account of all the JP4 that was all over the apron."

"And what was JP4 doing all over the apron?"

"Just lying in a big puddle. Came from the fuel truck. Pressure hose busted when they were servicing the Mohawk. Fuel poured all over the place before they could shut down the pump. Yes, sir, JP4 spilled on hangar apron . . . firemen sprayed foam over JP4 . . . Mohawk gear collapsed . . . crash truck boom hit wires . . . wires fell on fuel truck . . . fuel truck caught fire . . . set fire to hangar . . . burning embers from hangar set fire to storage shed . . . fumes inside

storage shed exploded . . . paint splattered all over car. Like to never got it clean."

The full impact of these events suddenly strikes you, and you sink deep into your seat. In a state of semi-shock you ask, "The hangar?"

"Gone, sir."

"And the aircraft?"

"They're gone, too."

"Lost . . . everything lost," you mumble almost incoherently.

"No, sir!" the driver retorts, his eyes sparkling and his voice filled with pride. "We've got the cleanest, shiniest staff car anywhere!" Then without pausing for breath, he inquires: "By the way, sir, how was your vacation?"

So much for fantasy. Yet, as we are jolted back to reality, we may very well find ourselves wondering just how much truth may actually be entwined in the fantasy described. After all, how many mishaps are truly unavoidable? Not many, and in almost every instance, we find that a chain of events preceded the mishap.

Consider, for example, the UH-1 pilot who autorotated his aircraft into trees. The autorotation became necessary because the engine failed; the engine, in turn, failed because the fuel control failed; and the fuel control failed because a mechanic took it upon himself to make an unauthorized fuel control adjustment in the field. In this instance, the series of events—chain reaction—are clearly visible. But this is not necessarily the case.

In another more recent mishap, an OH-58 pilot allowed his aircraft to hit a tree while he was performing contour flight. On the surface, it appears that a single "link" suddenly snapped, causing the mishap. This is partially true. However, an analysis of all the cause factors involved in this mishap clearly shows that a number of "saws" had been hacking away at the "link," weakening it to the point of failure. Let's examine the facts.

The pilot involved was participating in training exercises that included contour flight. However, because pilots and mechanics were in short supply, both were overworked, with pilots logging approximately two to three times the normal number of flying hours.

Under pressure to make the needed aircraft available, mechanics were forced to take shortcuts. For example, scheduled oil samples were not taken on the aircraft involved in the mishap, and the voltage regulator inspection was signed off although it had not been performed. (Both of these conditions, however, were rectified before the accident occurred.)

The pilot was not cleared to fly, having been medically grounded following the extraction of teeth. The platoon leader knew the pilot should have been medically grounded but did not verify his flight status as he was extremely short of personnel.

No terrain flight SOPs were available in the unit, and when pilots asked about them, they were told to "write one."

The IP was pressured by the platoon leader and the operations officer to get the pilot checked out because of the shortage of aviators. Although the IP was satisfied with the pilot's performance, he did not test him in terrain flying. Consequently, the planning phase of terrain flight was overlooked, and the pilot tried to navigate and fly along a course he selected during flight. When he diverted his attention to his map in an attempt to determine his location, the aircraft struck a tree.

In retrospect we find a number of "weak links" existed before the flight, any one of which could have failed and caused a mishap.

Tired pilots paired with improperly maintained aircraft; a medically grounded aviator allowed to fly a mission for which he was not fully checked out: inadequate flight planning, with no firm SOP guidelines to follow . . . . Conditions such as these virtually invite mishaps. And, of course, one occurred.

The fact is that safety in Army aviation is much like a chain in which managers, supervisors, pilots, mechanics, and all support personnel make up the links. Suspended by this chain is the load. Should we exceed the safety factor built into each link, a slight jar can cause the chain to snap and topple the load to the ground.

The solution becomes readily apparent: MAKE SURE EACH INDIVIDUAL LINK IS INTACT AND STRONG. And the brunt of this responsibility rests on the shoulders of management and all supervisory personnel. Unrealistic demands cannot be met without weakening one or more links in this chain that involves safety.

Let's make certain every link that comprises our chain of operations is strong, healthy, and capable of supporting the load it must carry, and, by doing so, help insure aviation safety.

U.S. ARMY SAFETY CENTER

ASSISTANCE VISITS OFFERED AGAIN

OVER THE YEARS, the Army Safety Center conducted numerous safety assistance visits to aid commanders in their aviation mishap prevention programs. But on the first of April 1978, we stopped these visits, primarily for two reasons: One was that, in 1975, each major command was tasked to come up with an aviation resources management survey (ARMS) team to perform duties similar to those we were performing during our assistance visits. The second was the initiation of Centralized Accident Investigation. This program required the realignment of some of our manpower to do on-site investigations of selected aviation mishaps worldwide.

While we have made no assistance visits since the end of March 1978, we have been able to provide some assistance to units through the use of our on-site Aviation Safety Officer Course. Part of the practical exercise of this course is a mishap prevention survey of an installation conducted by the students.

These surveys have been enthusiastically received by commanders and have helped uncover many deficiencies. These positive results have prompted the reinstitution of the safety assistance visit and evaluation program by the Army Safety Center. However, manpower constraints dictate a more !imited program than previously, with priority to those units with the greatest need.

Th primary purpose of our safety assistance visits and evaluations is to determine the effectiveness of an aviation unit's mishap prevention program. Our assistance teams consist of trained safety personnel with the ability to study a unit's mishap prevention program objectively and in depth. Team members are not surveyors, inspectors, or critics. Their only purpose is to help commanders identify areas where improvements would increase the effectiveness of the overall unit safety program.

The efforts of our assistance teams only serve to complement the endeavors of a separate survey or inspection group by another headquarters. A useful purpose is served by all these efforts, particularly so when the combination of these efforts is instrumental in saving lives and equipment. Following are some of the areas we address during our visits:

- Aviation management
- Operations/facilities
- Standardization
- Maintenance, supply, and POL
- Aviation medicine
- Training
- Air Traffic Control

Now, here's how the USASC assistance teams conduct an evaluation. Upon arrival, the team chief gives an entrance briefing to tell unit personnel about the team's mission and the functional areas the team intends to visit. The team then splits into subteams with their unit counterparts, and the subteams proceed to their particular areas of interest.

Team members observe normal operations and ask questions of unit personnel without undue interruption of normal operations. When the evaluation is complete the team chief gives an exit briefing which includes a concise summary of the team's findings by functional area. Specific mention is made of outstanding functional areas as well as areas with potential safety hazards. When the team returns to Fort Rucker, a careful analysis of all findings is made and the final report is compiled. The report, which is sent directly to the unit concerned, identifies areas for improvement and recommends corrective actions. It is then up to the unit commander and aviation safety officer to carry the ball and follow up with necessary actions to eliminate hazards.

In the past, acceptance of our assistance visits has been most gratifying. Assistance teams have been instrumental in getting the attention of several activities on many problem areas, resulting in immediate corrective actions.

As mentioned earlier, we are back in business and willing to help if you need us. Your request for an assistance visit must be made well in advance so that we will have sufficient time to schedule the visit. Our assistance must be requested by an installation, unit, or state. Requests should be sent to Commander, U.S. Army Safety Center, Fort Rucker, AL 36362. Direct communication is authorized by AR 10-29.

YOUR Christmas Captions

The December *Aviation Digest* asked readers to submit captions for the drawing of Santa Claus and a helicopter vying for the same airspace. We asked that the captions be functional and most are. It's hard to draw the line on some of the entries . . .

From MSG Edward B. Monroe

- Maybe the *correct* altitude *is* important.

From Dale T. Stewart

- I don't know, he's not on our flight schedule.
- Sure he has the right-of-way, it's Christmas Eve.
- There's no such thing as equal space, is there?
- Do you see what I think I see?
- Oh, no! Not me! YOU call the tower!
- He says to cut the motors, they're scaring his reindeer.
- He wants to hitch a ride as far as Cleveland.
- I think he wants to race.
- Put on what brakes?
- Heck no, don't put it in the flight schedule, they'd give us both a Section 8.

From John R. Cranford

- I can see a red light for *port,* but I can't see his green *starboard* light.
- I sure hope that guy filed a flight plan. With a rig like that, we could be in a heap of trouble.
- If I recall correctly, our flight plan didn't call for this far north.

From SFC Charles E. Martig

- I'll bet Santa's commander makes him wear red Nomex!

From CPT (P) Robert M. Combs

- Holy cow! The first thing they'll ask is, "Did you eat a good breakfast?"
- Recheck our course. I think we've drifted a little north.

From CW3 Warren V. Wandel

- Ho, Ho, Ho yourself, Fat Man! I don't care who you are. If you run me out of the pattern one more time, I'll ground you!
- Hey, Jones! What did you say you were taking for that cold?
- He tried NOE, but he couldn't get the darn reindeer to stop taking grazing breaks!

From CW3 Jim Robbins

- Traffic . . . Less than a mile? I don't see it, do you?

From MSG David Pimentel

- Boy I'd sure hate to autorotate that ship without any blades! All you could do is hold on for *deer* life!
- Yep that's Santa himself! You know CP, we are pretty fortunate after all if you think about it. Could you just imagine trying to fill out *his proper flight plan* in our operations? (GULP!)

From WOC Jock A. Spencer

- There's another one of those new crazy homebuilts with improper position lights.

From CW3 Richard E. Butler Jr. (RET)

- Hey Ed, did you check NOTAMS?
- I can see the accident report now, "HELICOPTER CREW KILLS SANTA." Do you think it will hurt our careers?
- You know, if we tell the CO, we're grounded!
- He only flys once a year and we're the ones who have to cut him off!
- I told you we should have come up on approach control!

From CW3 Walter A. Robinson

- I wonder why our proximity warning device didn't activate?
- Did you see that crazy chandelle?
- Isn't the illumination of only one light against AR 95-1?
- No! We absolutely can't stop so that you can pick up your toys.
- I wonder why his red light isn't flashing?
- Is that his right nav light or beacon?
- Vertigo! Vertigo!

From SSG Robert L. Wymer

- I know GCA is supposed to give traffic to aircraft on final approach; but, how would you describe it?

From MAJ Ivan C. Camp III

- You got it, sir!

From MAJ Allen Schwartz

- I F R: (I FOLLOW RUDOLPH).
- Proper flight planning controls traffic.

From SSG Thomas R. Stunda

- Right on time again. This year he's bringing us the new AR 95-33 and for maintenance the SQT test.

From LTC Eugene A. Pawlik Sr.

♩ ♩ ♩ ♩ ♩ ♩

- Do you see what I see?
- Forget the OHR! Nobody'd believe us anyway!
- I thought those gin and tonics only messed up your ears!
- Uh . . . Jacksonville Center . . . Uh . . . Disregard!

From MAJ R. L. Cardin

- You're *not* flying with him, so pay attention to what you're doing!

From MSG Kenneth Jach

- Do you think Santa got the word about the Army's aircrew life support equipment program?

PEARL'S

Personal Equipment & Rescue/Survival Lowdown

If you have a question about personal equipment or rescue/survival gear, write PEARL, DARCOM, ATTN: DRCPO-ALSE, 4300 Goodfellow Blvd., St. Louis, MO 63120

Turn-In Of AN/PRC-90 Survival Radio

Requests for information concerning the procedure for turn-in of the AN/PRC-90 survival radio for repair have been on the upswing. Information from SDSSA-TGS, Sacramento Army Depot, 16 November 1979, established that using units are required to return the item to its direct or general support unit for relief of accountability. If the using unit has signed for the item through a property book, the item should be turned in to the property book officer who would then be responsible for taking action to turn in the item to its direct or general support unit for drop from the unit property book. The support unit should then forward the radio on a 1348-1 document to Sacramento Army Depot. A copy of the 1348-1 turn-in document should be retained by the shipping unit to support the drop of accountability.

Current procedures at Sacramento Army Depot do not provide for returning a signed copy of turn-in documentation. However, one document which reflects receipt of the shipment is the return of Postal Service Form 3811 to the shipper. The support unit's copy of the 1348-1 form should be the authority to drop accountability of the item and to reorder the required replacement radio(s).

Any questions concerning this matter should be directed to CPT Art Calvin, Sacramento Army Depot, AUTOVON 839-2437/2438. The above information should not be construed as a change to local policy. Please let PEARL know if you have any problems.

Ordering Your AN/PRM-32A Tester

It has come to the attention of this office that there has been a problem getting the new AN/PRM-32A radio test set due to the fact that the item has not yet been included in the Army Master Data File (AMDF). Consequently, all normal requisitions for this item have been automatically rejected. CERCOM has assured us that the item should appear in the AMDF shortly, thereby alleviating the problem.

As an interim solution requisitions for the AN/PRM-32A may be processed "off-line" to preclude automatic rejection. This item may be ordered from B16, NSN 6625-01-013-9900. This is a PEMA (procurement of equipment and missiles, Army) funded, free issue item, as was its predecessor, the AN/PRM-32.

OOPS

"Forgive us, for we have erred." In PEARL, November 1979, in the article titled "Requisitioning ALSE," we gave you the incorrect NSN for the sealing washer used on the AN/PRC-90 radio antenna. The correct NSN is 5330-00-928-7079, not -7029 as previously reported.

Getting It On

If you are having difficulty obtaining certain items of life support equipment or associated test equipment, such as the AN/PRC-90 radio and AN/PRM-32 or -32A radio test set, the problem could simply be that this equipment is not on your table of organization and equipment (TOE)/Modification TOE (MTOE)/ tables of distribution and allowances (TDA).

These are both line item number items and must be on your TOE/MTOE/TDA in order to be obtained. To get items like these on your TOE/MTOE/TDA submit DA Form 4610-R, Equipment Changes in MTOE/ TDA, through appropriate channels.

Life Support Equipment Training

We recently have been informed by the United States Air Force Training Center at Chanute AFB, IL that the 4-week supervisory course, C3AZR92250-004 (Aircrew Life Support Equipment) has been discontinued. It has been replaced by a 2-week course, C3AZR92270-000 (Aircrew Life Support Supervisor). However, this latter course is a highly specialized level 7, totally Air Force oriented course, and is not currently open to Army personnel except through special waiver.

Requests should only be submitted to attend the 5-week, 4-day basic course, C3ABR92230-000 (Aircrew Life Support Specialist). Also, you may request to attend either of the U.S. Navy life support courses offered at Lakehurst, NJ (see PEARL, December 1979). These courses, although rather lengthy, are of particular benefit to those personnel dealing with parachutes and/or fabric repair.

Commanders Review

It is strongly suggested that commanders review the ALSE requirements set forth in AR 95-1, "Army Aviation: General Provisions and Flight Regulations"; AR 95-5, "Aircraft Accident Prevention, Investigation, and Reporting"; and AR 385-32, "Protective Clothing

Pamela Turner

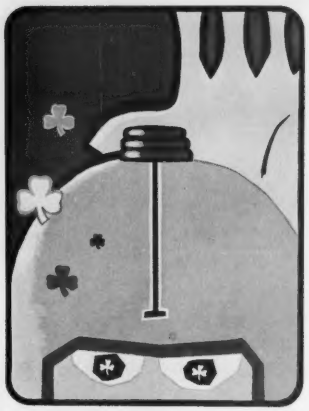
and Equipment," with regard to their responsibilities in providing proper safety gear, protective clothing and life support equipment for their aviation personnel. Commanders must consider geographic area, climate and mission requirements.

Desalter Kit

Questions have arisen regarding the service or shelf life of the kit, desalter, seawater, NSN 4610-00-372-0592, contained in the Army overwater survival kits. We have been informed that the service or shelf life of this item is indefinite, as long as it meets the inspection criteria set forth in TM 55-8465-206-23.

In addition, any desalter kits which are unserviceable should not be discarded, but rather turned in for reclamation. For further information contact Mr. Warren Kirk, DCSC, AUTOVON 850-3658.

VIEWS FROM READERS



Editor:

While on duty with the Reserve I happened to pick up your June issue and I have to write you my comment on the "girl" in "PEARL" section. Please give us more of her—she's "wow!" Don't suppose you would give out her phone number?

E-5 Admirer
Texas National Guard

• Glad you liked her. We did too. You're right about the phone number—sorry.

Editor:

As a 15-year Army aviation air traffic controller, I read with much pleasure and pride the first page scenario by Major General James H. Merryman, Commanding General, U.S. Army Aviation Center and Ft. Rucker at Ft. Rucker, AL, in the October 1979, ***Aviation Digest***. He writes about the new organization called the "Air Cavalry Attack Brigade (ACAB)" and refers to the ACAB as "a full-fledged member of the combined arms team."

It occurs to me that as a "full-fledged member . . ." that Army aviation should be awarded branch status and colors; that we, Army aviation, should be recognized as an equal with the Infantry, Artillery, etc. I realize that this is not a new idea but one which should be actively pursued with determination and zeal until achieved!

Pride runs deep within Army aviation. This is one of the things that has served to make it what it is today. Army aviation is truly "Above the Best" and with the ACAB there should be another new branch, AVIATION!

SFC Thomas E. Tucker
13th Co., 1st Bn
Ft. Rucker, AL 36362

Editor:

I am prompted by recent Department of Defense actions with respect to warrant officers to make a few comments, specifically with respect to the lack of flight pay equity for aviation warrant officers in the proposed flight pay raise (*Army Times*, 24 Dec, "DOD Backs Leaner Flight Pay Hike").

Noting that DOD has deleted the proposed provision for equalization of flight pay between commissioned and warrant officers is particularly distressing. In addition to the fact that Aviation Career Incentive Pay is the only incentive pay which distinguishes between commissioned and warrant officers, it should be noted that warrant officer aviators consistently assume a level of responsibility equal to or greater than commissioned aviators. For example, 94 percent of the instructor pilots and instrument flight examiners are warrant officers as are 75 percent of the safety officers and 42 percent of the maintenance officers.

The aviation warrant officer not only performs the vast majority of the flying but is often called upon to perform section leader or platoon leader duties, manage aviation or motor maintenance programs, and to accomplish numerous other administrative duties including assistant or even primary battalion staff. With the present and anticipated future shortage of both company grade commissioned aviators as well as warrant officer aviators, the warrant officer is and will continue to be expected to pick up the slack both in and out of the cockpit. The warrant officer is unquestionably the backbone of Army aviation.

It has been suggested by Department of Defense that there is no retention problem in the warrant ranks. The facts suggest otherwise. It is a fact that more than 50 percent of junior aviation warrant officers elect to be released from active duty upon completion of their initial service obligation and that only 8.4 percent of aviation warrant officers choose to remain on active duty beyond 20 years. Furthermore the Regular Army program, which is designed to retain the valuable technical expertise of the warrant officer for a more desirable, cost effective 30-year utilization, is having marginal success at best. To date only 28 percent of the entire warrant officer corps have accepted Regular Army appointments.

Considering the flight pay question in light of the recent Department of Defense Pay study which recommended basic pay raises for a number of enlisted and commissioned grades yet totally excluded warrant grades, it is no wonder that many warrant officers perceive that they are being treated as cheap labor and are in fact second class aviators.

I find it particularly disturbing that warrant officers appear to be waiting for someone to "take care of them" on this issue, because as with the last flight pay bill in 1974, it just isn't going to happen. I might suggest that if an

equitable solution to the flight pay issue is truly desired, then each and every warrant officer must decide to become *personally* involved. Make your desires heard on this subject by writing to your elected representatives and giving them the true picture of your place in Army aviation. Join the Warrant Officer Association now. This organization alone speaks for warrant officers and intends to take this issue to Congress directly.

It is now also time for the Army command structure, the Association of the U.S. Army, the Army Aviation Association of America and other such service organizations to join in the appeal for a truly equitable flight pay system which fully recognizes the professionalism, dedication and contribution of Army aviation warrant officers.

CW3 Harry P. Arthur
6501 102d St. E
Puyallup, WA 98371

Editor:

I enjoyed the article about warrant officers in the November ***Aviation Digest*** |"The Warrant Officer . . . The Who? page 9|. It's nice to read about yourself once in a while. However, I read something else recently that was not quite so enjoyable.

The ***Army Times*** indicated that the latest version of the proposed flight pay (formerly hazardous duty pay) increase does not include parity for warrants with commissioned pilots. A reason given was that there is no retention problem with warrants.

Somebody needs to be straightened out somewhere. Army warrants do the bulk of the hard professional flying and are getting the dirty end of the swagger stick. I see good pilots everyday who cannot wait to get out. Who is kidding who up there in never never land?

I want a flight pay increase like anyone else, but I would rather pass it up than see someone get more than me. Especially when he/she does not deserve it.

Politics is a no-no for service members, but my Congress persons are going to hear about this one. I might even join some kind of association that feels the same way I do! WOPA!

CW3 Thomas M. Valentine
269th Avn Bn
Ft. Bragg, NC 28307

Editor:

I read with interest SSG Larry Cotton's letter concerning maintenance production versus quality in the October 1979 ***Aviation Digest.*** I agree wholeheartedly with his comments and would like to add my own.

First of all, I don't know of any AVUM unit TOE that authorizes a quality control section as such. Normally, a TI or two is assigned to the various sections within the AVUM platoon; i.e. headquarters, maintenance of component repair. This is wholly inadequate in view of a TI's duties and responsibilities. The administrative burden alone takes up at least 60 percent of a TI's time (if the job is done as it should be done). Being organized in this manner the TI normally ends up working for that section's supervisor causing the age old production/quality conflict. Most units are organized with a quality control although this is not specified in the TOE. Who does the section normally end up working for? The maintenance officer or NCO. Conflict again!

There is one way that we can begin to eliminate the production/quality conflict. That is to take the quality control (QC) section out from under the maintenance hierarchy, having the inspectors working strictly for, and be rated by, the unit commander. (I can hear the cries of anguish.) All commanders with whom I have been associated have had a high regard for maintenance quality. Only by having the TI's work for him/her will the commanders' quality standards be applied to the aircraft. Sure, there will be conflicts between maintenance QC and the OR rate will drop somewhat. So what! I place the value of an aircrewmember's life just a bit higher than I do a percentage figure. There will always be periodic conflict in this organizational method, however, the decreased OR rate will be temporary. Once quality is returned to the aircraft through *by the book* maintenance, reliability will increase causing a reduction in unscheduled maintenance. Sure, tempers will get short at times but once mechanics, crewchiefs and supervisors learn the quality standards expected of them the day to day operations will smooth out.

Most units that have nonrated aircraft maintenance warrant officers (MOS 160A) assigned have them slotted by TOE in the component repair section. I feel that this is a total waste of experience and training since, by being slotted in component repair, this individual's sphere of influence is limited to one section. As QC gets involved (or should get involved if it does not now) in all aspects of aircraft maintenance the 160A should be designated by TOE as quality control officer. In this way he can directly influence all individuals involved in the maintenance effort. Again, by being the QC officer, he/she should work for and be rated by the commander.

Unit commanders can make these organizational changes now, informally. Department of the Army should make them permanent by reorganizing the AVUM platoons to include a quality control section. The 160A, if assigned, should be slotted in the QC section. Only by organizing aircraft maintenance in this manner can we start to give the aircrewmembers the quality product that they deserve.

CW2 Jeffrey B. Foster
Quality Control Officer
82d Combat Aviation Battalion
Ft. Bragg, NC 28307

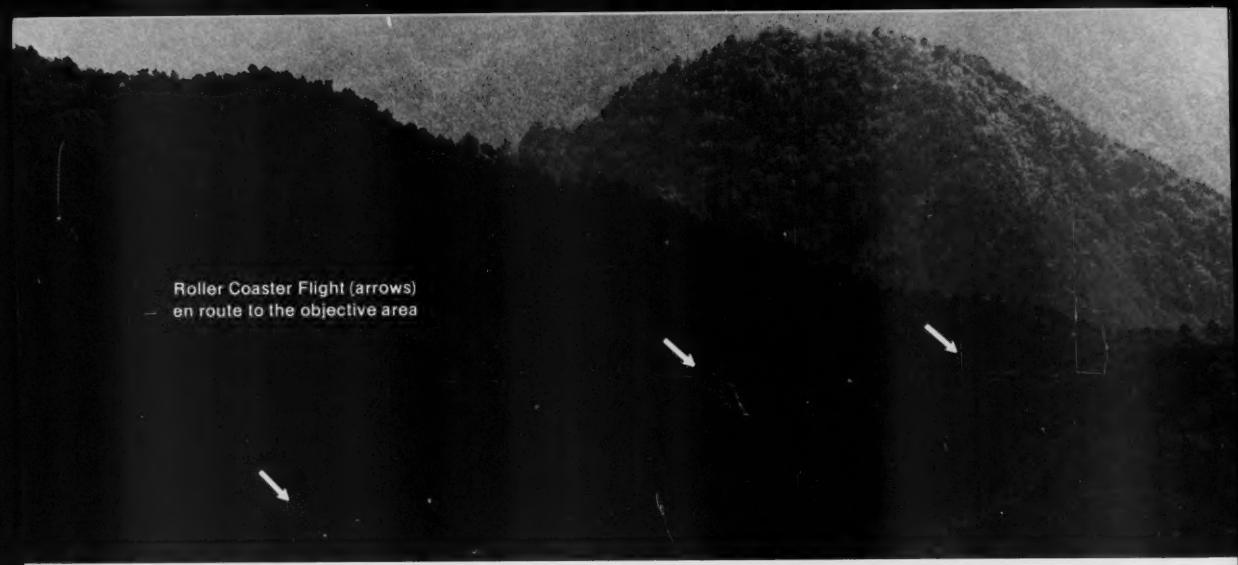
Editor:

In reference to SSG Cotton's letter in the October 1979 issue, I also agree that quality should never be sacrificed for production. However, I could not help but detect a possible existence of tunnel vision in the sergeant's letter. Now that he is on the quality side of the house, is it possible he believes that quality control personnel do not have to concern themselves with production?

I've worn both hats also, and am a firm believer that if you have a good quality assurance program, then there won't be any problem meeting or exceeding production standards. The mere fact that he has not seen a maintenance officer yell "quality," suggests to me that he may not fully understand the meaning of "quality," or the function of quality control. I've never met a maintenance officer that didn't desire both, quality and production.

I can only suggest to Sergeant Cotton that maybe he should take a peek at TM 55-411 and see if there is room for improvement in his QC program.

CW2 Jerry L. Verkler
62nd Avn Co
APO New York 09039



Roller Coaster Flight (arrows) en route to the objective area

ROLLER COASTER OPERATIONS ACROSS THE FEBA

LTC William C. Page Jr.
Commander
52d Aviation Battalion (Combat)
APO San Francisco 96301

AIRMOBILE OPERATIONS across the FEBA? In a mid-intensity war?

The whole idea raises a spectrum of doubts, fears and apprehensions. The thought is not new, and many attempts have been made to solve real world problems that tend to prohibit such an operation.

Units in Europe will tell anyone, with patience enough to listen, that such an operation can be conducted; however, you better be prepared for "Charge of the Light Brigade" results! But have we really looked into all possible options? The 52nd Aviation Battalion (Combat) in Korea thinks not. Using a few new answers, the battalion conducts "behind the FEBA" training missions on a regular basis. It's not because troops in "The Land of the Morning Calm" are smarter than those in other places. They put their Nomex on one leg at a time like everyone. However, they look at something day after day that most aviators in the rest of the world do not—mountains, mountains and more mountains. It isn't just the occasional outcroppings, but grid square after grid square of rugged, almost impassable terrain. You can't fly in that area for long without thinking, "I never saw terrain like this in Germany, Texas or Kentucky." It *is* different!

THREAT

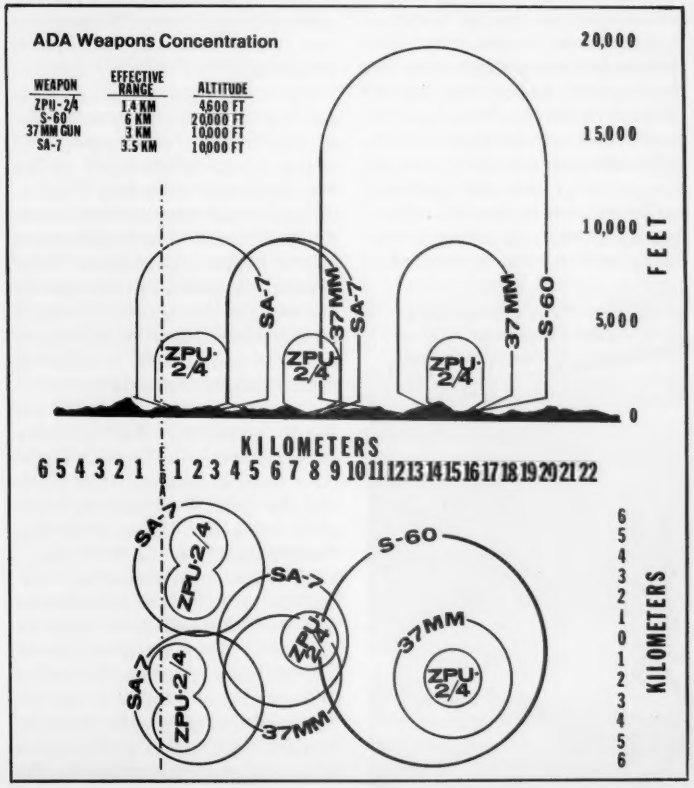
When considering the threat that tends to forbid airmobile operations across the FEBA, this rugged terrain becomes overwhelmingly important. To amplify this point let's quickly review the threat in question. The doctrine of our potential adversaries in almost any mid-intensity war scenario doesn't differ much from theater to theater. Basically, we are faced with an array of IR, radar and optically controlled ADA weapons. As expected, the heaviest

Sound training—flight discipline—favorable terrain and a well thought-out plan are necessary for aviators to accomplish airmobile operations across the FEBA successfully without "Charge of the Light Brigade" results!

concentrations of these weapons are well forward, protecting the cutting edge of the sword (figure below).

Proceeding into the enemy's rear (10 to 20 KM in Korea), we find a considerable "thinning" of the array. Let's face it, *nobody* can protect the entire rear against all threats. The commander is forced to select the most important areas leaving other sites vulnerable.

Additionally, the majority of the rear area protection (that is, SA-6 and SA-7 missiles and 37 mm and larger guns) is oriented against the more predominant, fast-mover air threats. Laid out on a pool table, this array looks effective. But throw in, not just a few mountains, but range after range of rugged terrain and a new picture begins to form. At very low altitude, it is apparent that vast gaps of free airspace exist—and they are not hard to pick out. Basically, by sticking to the roughest mountains and shying away from the major valleys where the MSRs, rivers and builtup areas exist, the major ADA threat is considerably reduced if not virtually eliminated. Get through that initial defensive belt, and the going for low and slow aircraft becomes a bit easier. OK, now that you have the picture and are beginning to think about the possibilities, let's hit a few more points on ADA technology.



Radar: A formidable opponent, but obviously it can't see through a mountain. There's another aspect of radar technology aviators often overlook. Even if we get on the wrong side of the hill, most radars *still* have trouble locking on if there is a terrain backdrop! Sure, there are a few systems that use doppler effects, but they are not predominant on any of today's battlefields and definitely not in Korea.

IR: Another "toughie" given the right circumstances, but it has a few problems. Without getting too technical, let's look at a few particulars. Most of us think about IR systems as heat seekers. Actually, the amount of IR radiation given off by an object depends on two factors—temperature and emissivity. As luck would have it, the good earth and its associated plant life have one heck of an emissivity factor. Recent tests show that IR

Glossary

ADA	air defense artillery
AH	assault helicopter
AO	area of operations
CAV	cavalry
CP	checkpoint
FEBA	forward edge of the battle area
IR	infrared
KM	kilometers
LRRP	long-range reconnaissance patrols
LZ	landing zone
mm	millimeter
MSR	main supply routes
NOE	nap-of-the-earth
PZ	pickup zone
ROKA	Republic of Korea Army
ROK	Republic of Korea
RP	rendezvous point
SF	Special Forces
TOC	tactical operations center
TOE	tables of organization and equipment

energy given off by terrain is so pronounced that an aircraft's exhaust plume cannot be picked up effectively if the earth is the backdrop. This is another big selling point for good NOE technique! Once again, mountains give a distinct advantage to the aviator. Even if seen by an alert SA-7 gunner, the seeker has difficulty locking on as long as you don't skyline. Add IR suppressor kits, and we're looking good!

Optically controlled weapons: Discussion on how to defend against ADA systems can be quite succinct. Try not to be seen but if you're seen, minimize exposure time or be out of range. Keep this thought in mind because in the mountains the air defender can't always put the weapon exactly where it is needed. Even the simplest gun system can't be employed readily in terrain formidable to a goat.

"Wait a minute!" you might say. "Wouldn't this ring true throughout the entire mountainous battle area?" That's exactly the point. In a fluid battle situation, vast stretches of rugged terrain tend to become a kind of lightly defended "no man's land." Combined with weapon limitations outlined above, we find a "chink" in the enemy's ADA system that *begins* to make airmobile operations behind the FEBA feasible. Begins is an excellent choice of words because being able to penetrate the FEBA successfully is only the beginning. The feasibility has enabled the 52nd Aviation Battalion (Korea) to carry the potential to fruition. In October 1978 the battalion, in conjunction with the Special Warfare Command, ROKA, began developing tactics and training needed to accomplish airmobile raids deep into the enemy's rear.

After many technical seminars pooling the best thoughts of our most experienced planners and aviators, certain characteristics of such an operation have emerged. First and foremost, the ground commander's tactical plan establishes mission requirements. As always, this is paramount! In assault helicopter operations, the purpose of the drill is to enable the ground Soldier to accomplish an assigned task. Aviators can lose this thought easily and, if not careful, end up with the cart before the horse. In a raid the ground commander requires mass, surprise and perfect timing. Our job is to get the ground commander to the destination in the desired configuration. A lot of planning, coordinating and training is devoted to that portion of the operation. However, let's limit our discussion to the aircrew's problem.

After analyzing the threat, it becomes apparent that the assault force must use terrain flight techniques that put it far enough up the hill to be out of effective range of most guns systems (3 to 4 KMs) yet far enough down the mountain to prevent skylining. The general term "terrain flight techniques" must be used, for, in actuality, the flight profile required is a combination of NOE and contour flying.

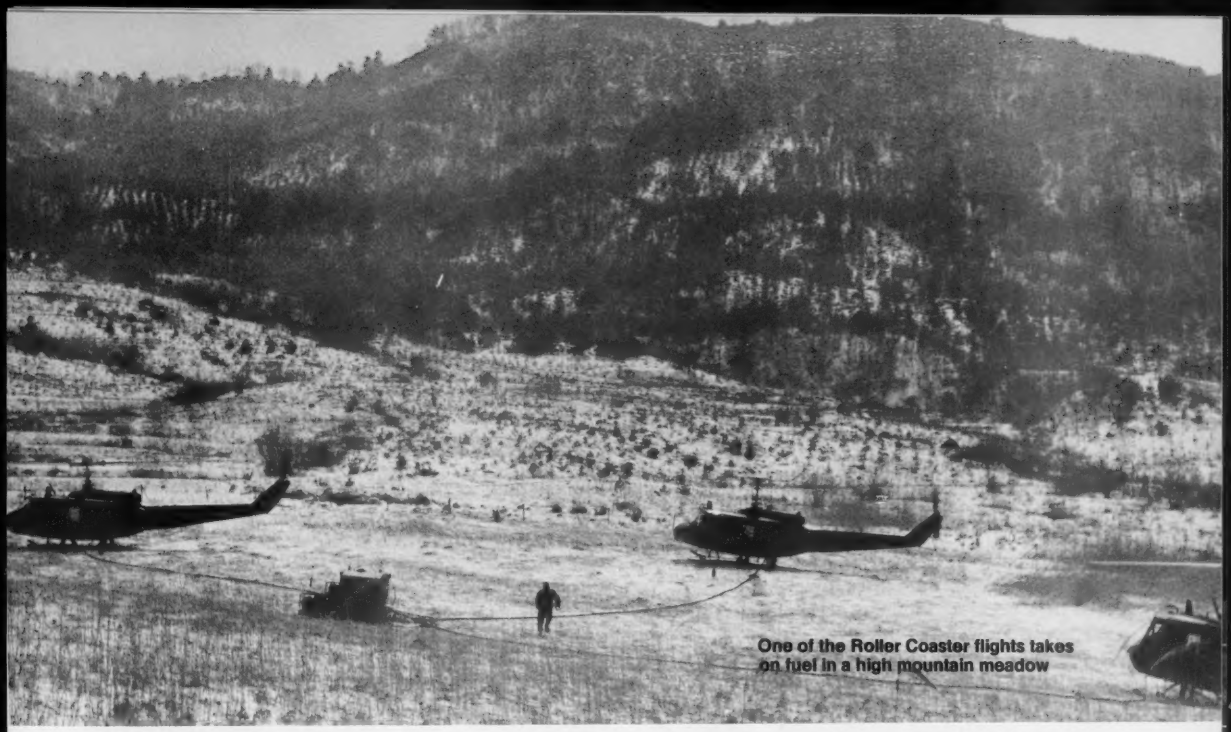
Because of the allowable cargo load and relatively high density altitudes, *translational airspeeds* are necessary.

After all, the object of the drill is not "snoopin' and peepin'" from behind a rock. The object is to get from A to B successfully. The key to success depends upon the crews' ability to hug the side of those mountains using whatever technique is required.

The result is a flight envelope that varies from 30 knots for the tight turns around outcroppings and sliding across saddlebacks, all the way up to and exceeding 80 knots through areas where contours are relatively sedate. The resulting ride produced the local moniker, "roller coaster." Actually, a properly planned mission does not result in many rapid changes in altitude; therefore, the buzz word "roller coaster" is somewhat of a misnomer.

The absence of hair-raising climbs and dives is accomplished by leaving the maximum latitude possible for the aircrew's planning. After analyzing the general terrain and available intelligence, the one-over-the-world planners at the TOC assign air corridors near identifiable terrain features, such as pronounced ridgelines and peaks, to facilitate navigation. Then, the aircraft crew has the latitude to plan its actual flight course in relation to the detailed contours of the earth. It merely remains oriented on predominate terrain features encompassed by the

"Leave-behind" FARE system used to extend the range of Roller Coaster operations



One of the Roller Coaster flights takes on fuel in a high mountain meadow

corridor. This technique is nothing new for you proficient nap-of-the-earthers. With this freedom aircrews are able to accomplish climbs and descents by sliding up and down mountains while remaining 10 to 50 feet above ground.

Flight crew planning is the heart of a successful mission and is the commander's largest training challenge. It can be accomplished only through excruciating map study. Without attention to detail in this step, the flight doesn't stand a chance. One of two things (if not both) will happen early in the mission. The crew will:

- Pop over a ridgeline at the wrong angle and find itself skylined 2,000 feet above the ground.
- Become lost in the worst possible place—right over the FEBA.

There are other *special requirements* involved in detailed map planning that normally are not found on other terrain flights. *Checkpoints* must be selected at very close intervals (not more than 2 minutes apart is our rule of thumb). Additionally, *altitude* data is written out to the side of the CP! That ole' mountain will take on a new shape if you inadvertently slide an extra 500 feet up the side. Also, altitude control will assist in preparing to cross saddlebacks and ravines that will, all at once, appear around the next corner. Here's another way of putting it—terrain flight is planned in three dimensions.

After long discussions and actual flight experiences, our philosophy is that multiple entry routes are the best assurance of getting an effective ground force to the objective. You never know when one of those "buggers" will, by luck of the draw, handcarry, piece by piece, a quad 14.5 right to your intended route. Further, we have found that two to three aircraft in a five to six rotor disk trail is the optimum number of aircraft per route.

MASS

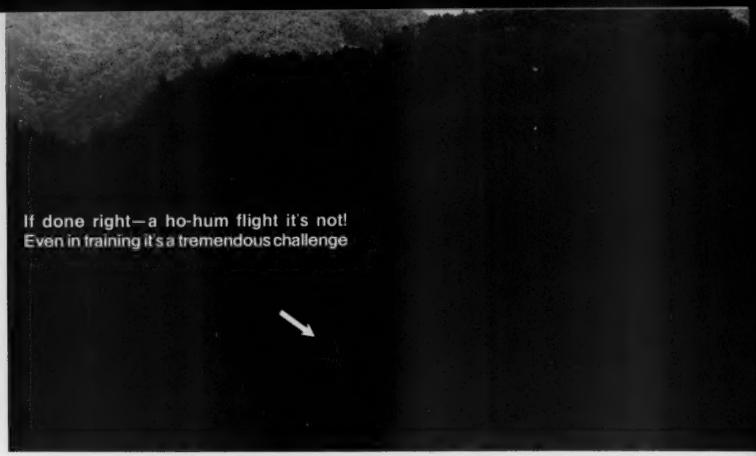
Although this multiple route technique is the most secure and deceptive, it creates another problem. At some point, sooner or later, the entire force must obtain *mass.* This means a precision rendezvous, short of the objective, sufficient to ensure there is no orbiting while you wait on a "Tail End Charlie." Above all, every flight must reach rendezvous precisely on time. Plus or minus 30 seconds is our standard. Actions at the rendezvous are sufficiently crucial to justify a few more words on coordination techniques.

Since there can't be any "fiddlin" around and orbiting at rendezvous, the first flight there automatically becomes the *assault force lead element.* It is *vital* that all subsequent flight elements know the lead element. Rendezvous is the only point where radio silence is broken; as each flight reports as it is passing. To enable subsequent flights to close and obtain mass on the leader, the lead flight must be stabilized at a predetermined, moderate airspeed. Generally, 80 knots has proven best if circumstances permit.

The period in which the force is massed must be minimized. Yet rendezvous must be far enough from the objective to allow massing. Choice of the rendezvous point becomes somewhat of a "catch 22" situation. Experience has taught us that the optimum is 10 to 15 KM from the objective area.

SURPRISE

In the objective area, *surprise* is paramount. Most likely, any ob-



If done right—a ho-hum flight it's not! Even in training it's a tremendous challenge

jective important enough for our side to be interested in will also be important enough for one of those rear area pockets of ADA to protect. Let's be totally objective; the going will get rough when the air assault force crosses that last ridgeline. To minimize the tough going, the objective must be hit quickly and the aircraft exposure time cut to the smallest degree possible.

SUPPRESSIVE FIRES

In addition to mass and surprise, *suppressive fires* on an occupied objective are a must! Artillery is usually out of range. Air Force support has been considered and can be used, but timing is crucial. For us, a good solution has proven to be firepower organic to, and flying with, the assault force. Our old friend, the attack helicopter, again fills the bill. Since modern TOEs no longer have guns organic to the assault company, this capability must be attached from CAV or AH troops. In Korea we use the super little ROK gunship, the Hughes 500 MD. It lacks a little in payload but is always ready and available. Usually, one rocket-carrying gunship tagging along with each three aircraft lift element does the trick. Their mission is to provide suppressive fires at the LZ—not protection en route.

At rendezvous, the guns team up and proceed to a predetermined firing position along that last mountain and, as the assault element becomes exposed coming inbound, the guns simply unload on the objective area from their standoff positions. As you know, this scatters 17 pounders all over "hell's half acre," but it does a beautiful job of suppressing when teamed with the element of surprise. The desire is to drive people into their holes and under cover. You older pilots remember your reactions to the first inbound 122 mm in 'Nam. We're looking for the same effect. Additionally, the fires tend to obscure blade noise and assist in the deception.

The ground commander's plan usually requires that specific teams be placed on specific points in the objective area. This requires back planning to determine individual aircraft loads. Accordingly, at the RP the flight tends to break up into individual flights of one. A word to the wise! Without sufficient emphasis, this maneuver could turn into a real gaggle; however, detailed planning and disciplined flight training maintain control even during this critical period.

OK, we've gotten the raiding force onto the objective deep into the enemy's rear successfully, now what? On some missions the ground force may want to stay behind (LRRPs and SF teams) thus simplifying the aviation task. However, on most operations the infantry wants to come out as soon as the dirty work is done—usually a matter of minutes. The lift element must loiter in some safe haven, since the 1/16 inch aluminum sheet isn't much protection. Once again, mountains come to the rescue. Using procedures previously discussed, loiter routes designed to return lift elements to the LZ at the designated time are planned.

The second approach into the objective really can increase the pucker factor because you have a lot of hacked-off people, and the element of surprise is lost. Also, the ground force frowns on the idea of area suppressive fires on the second approach into the AO. However, the ground force commander is as interested as we are in neutralization of ADA weapons. As a result, one aspect of the ground tactical plan always provides for fire suppressive teams whose sole mission is to render close-in ADA positions ineffective. Additionally, the attack helicopter, using turret systems, can be taken in with the lift elements the second time around to assist with ADA suppression.

The pickup can be another complicated problem if not properly planned and coordinated. In addition to predesignated pickup points, colored panels and 2 by 2 feet, hand held, color-coded cards are displayed by the ground force to assist recovery aircraft into the correct PZ. Once recovery has been accomplished, the tough sledding is virtually over. Using the same techniques that were used for entry, the flight elements rejoin on multiple exit routes for the return trip home.

Airmobile operations across the FEBA? A simple ho-hum flight it's not! Even in training it's one of the most challenging requirements around. Kick the tire, light the fire and brief on guard flight discipline won't cut it—neither will the, "OK men, you know what to do," type planning. It requires sound training, flight discipline, favorable terrain and a well thought-out plan to be successful. But given the right circumstances and conditions, aviators in the 52nd Aviation Battalion are confident in their ability to accomplish such a mission, and do so without "Charge of the Light Brigade" results. Look around you. Got any mountains in your AO? If so . . . !

The acronym TASVAL stands for tactical aircraft effectiveness and survivability and was a Department of Defense test which explored the effectiveness and survivability of two aircraft. Army aviation was represented by the AH-1 Cobra S and Enhanced Cobra Armament Systems (ECAS) models and Air Force by the A-10. For the test a threat force array was assembled. All equipment on the test battlefield was instrumented. Firing vehicles and aircraft fired an eye-safe laser to simulate onboard weapons systems and each had a laser sensor to sense hits. The entire test was computer monitored and lasted in excess of 6 months

The TASVAL Experience

Major William M. Durbin

CONTEMPORARY aviation tactics are significantly influenced by the threat force weapons array and developed to take maximum advantage of their limitations and minimize or degrade their capabilities. One of the most important limitations of any weapons system is the maximum range to which it is effective. It is this limitation which had the greatest impact on the tactics and techniques developed during TASVAL to counter the ZSU-23-4 and ground force armor and motorized infantry weapons. (The counter to the remainder of the air defense threat will be addressed in an article to be published in a subsequent issue.) The basic ranges around which the concepts were developed are listed in figure 1.

From these figures it was concluded that there was a range of 750 meters at which the AH-1 Cobra could engage armor and motorized infantry and maximize the kill ratio. TOW (tube-launched, optically-tracked, wire-guided) missile engagements would commence at 3,750 meters and the aircraft could begin repositioning at 3,000 meters, or revise repositioning for flank engagements. The 3,000 meters is not magic and there is a good argument in modern combat for repositioning at 2,000 meters also.

The key to successfully implementing these standards was the proper estimation of range. One point which must be addressed at this juncture is the laser rangefinder. If the laser rangefinder is installed and if it is operational (it was not available for TASVAL), range estimation techniques are unnecessary. Because the rangefinder is a sophisticated and complicated

Figure 1

	Maximum Effective Range
TOW	3,750 M
ZSU-23-4:	
Optical	2,500 M
Radar	3,000 M
Armor and Motorized Infantry	<2,500 M (Against ATK Helicopters)

Figure 2

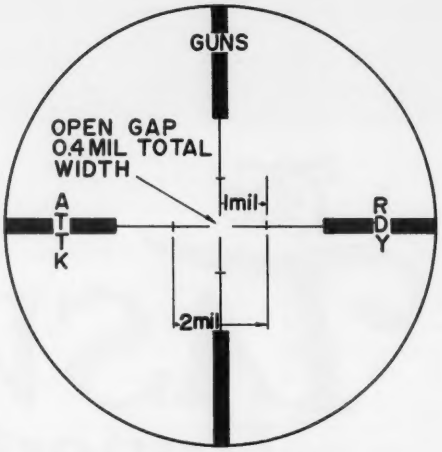
W=WIDTH OF TARGET IN METERS
R=RANGE TO TARGET IN METERS
M=MIL VALUE OF TARGET

WORM FORMULA

$\frac{W}{M} \times 1000 = R$

MATRIX FORMULA

$\frac{W}{3.5} = M$



electrical component it is subject to malfunction and because it presents a laser signature it may be advisable to be highly selective in its use. Therefore, the development of and proficiency in manual techniques are a necessity.

There were two manual range estimation techniques used in TASVAL. First, of course, was by reference to the map and knowledge of the position of both the aircraft and the threat target. This method is cumbersome and time-consuming and the least desirable of the two. Second was the application of the WORM formula (figure 2) to the telescopic sight unit (TSU) reticle. This technique proved to be extremely effective and was developed and refined throughout the test. It

Figure 3

VEHICLE	LENGTH	WIDTH	% FILL OF 2 MIL RETICLE	
			SIDE VIEW	FRONT VIEW
M 151 A2 JEEP w/ TRAILER	3.4 M	1.6 M	50%	25%
M 35 2½T TRUCK	6.7 M	2.5 M	100%	36%
M 113 APC	4.9 M	2.7 M	70%	40%
CHAPPARAL	5.6 M	2.6 M	80%	40%
ZSU 23-4	6.5 M	3.1 M	93%	45%
M60 A1	7.0 M	3.7 M	100%	55%

Computations based on matrix formula at figure 2. Percentages rounded

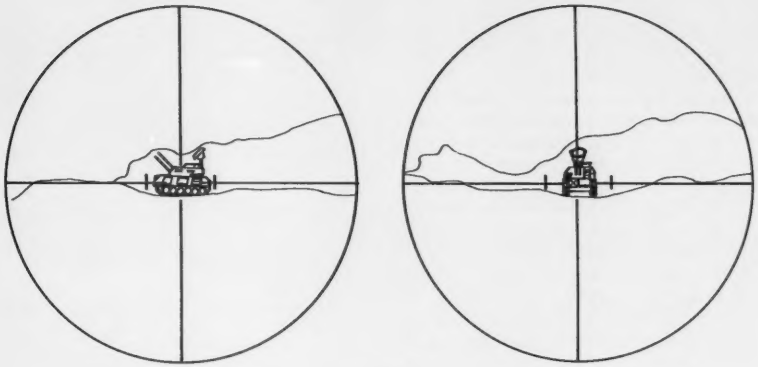


Figure 4

is this development and refinement which will be addressed in the remainder of this article.

In the WORM formula there are three unknowns: the width of the target, the mil value of the target and the range to the target. To develop this technique the dimensions of the targets were extracted from current Army publications and the mil values of the TSU reticle were extracted from appropriate technical manuals. The dimensions of the 13-power TSU reticle are depicted in figure 2.

The approach decided upon for application of this formula was to compute a figure which would cue the gunner when the target vehicle was in range to fire the first missile. The range selected as "in range" was 3,500 meters because, through experience in TASVAL, it was learned that the mean error at maximum effective range was 200 meters. Once these parameters were established it was a simple matter to transform the WORM formula from W/M × 1,000 = R to W/R = M and insert the 3,500/1,000-meter range and the vehicle dimension to derive a mil value for the target which would key the gunner to launch. To further simplify and speed up the gunner's decision the mil value was then divided by two and a percent fill of the two mil reticle was the standard. Once this information was computed it was transferred to a matrix similar to the one depicted in figure 3.

The vehicles used in this example represent the target array for TASVAL but easily could be replaced by threat vehicles and their actual dimensions. This matrix was then reduced to kneeboard size and a copy distributed to each pilot in the troop. They became an integral part of each mission for the day's assigned gunners.

Once this matrix was distributed and implemented it was decided that training could and should be devised to use the technique more quickly and accurately. A series of flash cards was developed for the air defense vehicles and armor vehicles which depicted a 13-power TSU reticle with the vehicle drawn in to scale as seen by the gunner. From this sight picture the gunner was to determine in range or out of range and then turn the card over for the answer and immediate feedback. Very early it was determined that aspect angle was difficult to assess at maximum ranges; this problem was simply solved by using the largest of the aspect angles possible thereby guaranteeing an in range determination. One page of the flashcard book devised at TASVAL is shown at figure 4.

These range determination techniques have a tremendously wide range of application for all branches of the military. Any Soldier who has a means of measuring mil value either through optics or mechanical means can use it for determining engagement ranges. A matrix, flashcards and additional training aids are simple to construct and very inexpensive.

Additional techniques were developed which those of us who participated in TASVAL hope to share with the military community in future articles of this series.

About The Author

The author of this article is Major Bill Durbin, an Infantry Officer who has commanded an infantry rifle company in Europe and now is the S-3 of the 7/17th Cavalry (Heavy Cav), an attack helicopter squadron of the 6th Cavalry Brigade. Major Durbin, as the troop operations officer of the troop which participated in TASVAL, was responsible for all pre-TASVAL preparation training and spent 5 months conducting the test before returning to Ft. Hood to become the squadron S-3. He is rated in the AH-1S modernized Cobra, the Cobra production S, the ECAS Cobra and the G model Cobra.

DEPLOYMENT OF combat ready Army personnel and their equipment anywhere in the world was a prime consideration when specifications were developed for the UH-60A Black Hawk utility helicopter—it had to be air transportable.

Using a U.S. Air Force C-5 transport aircraft, Soldiers of the 101st Airborne Division (Air Assault), at Ft. Campbell, KY, successfully tested the air transportability features of the Black Hawk during a simulated deployment exercise. A team, comprised of six Soldiers who were alerted only a short time before the exercise began, took about 1 hour and 45 minutes to prepare each helicopter for air transport. In another 2 hours and 45 minutes the UH-60s were completely loaded aboard the C-5.

Another purpose of the exercise was to provide the Soldier team with experience in breaking down, loading, unloading and reassembling the aircraft to flyable status in a combat ready condition. To prepare the helicopters for shipment aboard the C-5, principal tasks included folding the main rotor blades, folding the tail rotor blades and the removal of the stabilator.

The 101st Division Black Hawk team first loaded five of the helicopters aboard the transport aircraft, simulated their deployment and then reloaded the original five plus another UH-60—making a total of 11. Captain William Zanow, commander of the exercise said, "It was a good test for the Soldier team which did very well for the first such exercise."

The Screaming Eagles of the 101st Division have a long standing reputation for being combat ready—their UH-60s have joined the team.

❶ In they go—Black Hawk helicopters are loaded aboard a C-5 Air Force transport aircraft during an exercise designed to train personnel and evaluate the deployment capabilities of the Black Hawk. (Photo courtesy of TSARCOM)

❷ 101st Airborne Division (Air Assault) crews unload one of Delta Company s UH-60A Black Hawk helicopters from a C-5 at Ft. Hood, TX as a previous C-5 departs. (Photographs 2 through 10 by Jim Tobin, Sikorsky Aircraft)

❸ Black Hawk Helicopters depart the battlefield over troops, tanks and trucks during Dragon Team XI

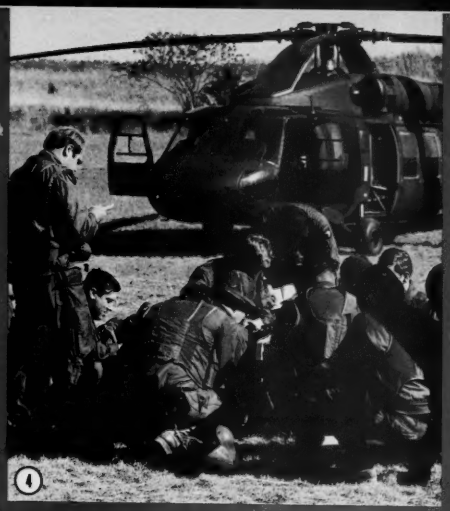
❹ Aircrews brief for their first mission during Dragon Team XI at Ft. Hood, TX, as a Sikorsky Black Hawk helicopter stands ready for flight

❺ Troops await the order to pull out of the battlefield as Black Hawk helicopters depart, each carrying a full squad of Soldiers

❻ Crews unfold Black Hawk rotor blades at Ft. Hood, TX in preparation for the start of field operations during Operation Dragon Team XI

❼ A row of Sikorsky Black Hawk helicopters, their rotors turning, stands ready to pick up troops and move them to another battle zone during Operation Dragon Team XI at Ft. Hood, TX

❽❾❿ Three views of Black Hawks, carrying sling loads, arriving on the mock battlefield at Ft. Hood, TX during Dragon Team XI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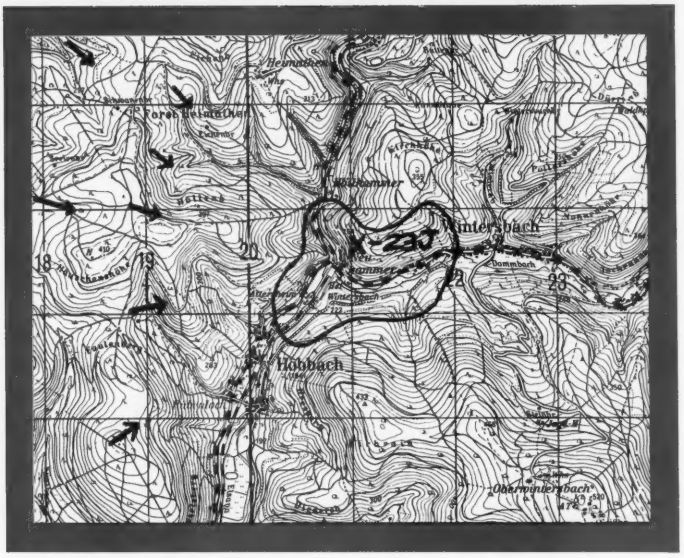


FIGURE 1

TRAIN TO FIGHT

LTC Eugene H. Grayson Jr.
Office of Deputy Chief of Staff for Operations and Training
Headquarters, Department of the Army
Washington, DC
and
LTC Glenn R. Allen
Operations Staff Officer
U.S. Army Concepts Analysis Agency
Bethesda, MD

IN THE EVENT of hostilities in the European environment against Warsaw Pact forces possessing 45 to 50,000 tanks and 45 to 55,000 personnel carriers, rapid employment of limited attack helicopter assets as a vital element of the combined arms effort will be an absolute necessity.

Threat doctrine specifies massing of forces for swift, deep penetrations into an objective area. Time will not be available for extensive planning, coordination or reconnaissance to counter this thrust if the adversary achieves initial successes. Thus, it is imperative that attack helicopter units be prepared to provide immediate antiarmor firepower to counter this threat.

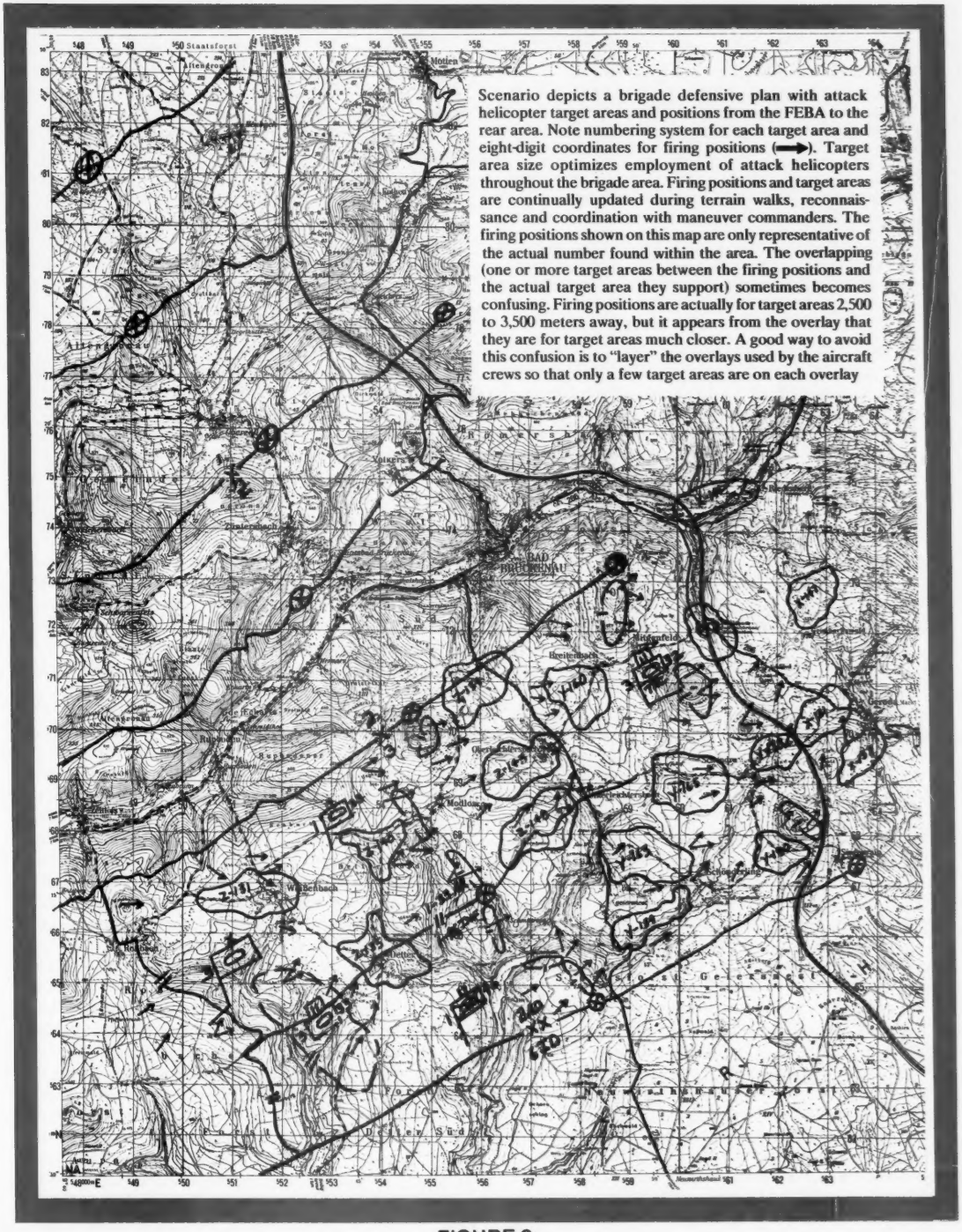
Fortunately, Army aviators in Europe are able to train extensively in the area where a future war may have to be fought. Daily training missions are possible throughout the GDP area, and except for built-up areas, flights may be flown at low level, contour or NOE altitudes. Detailed reconnaissance of target areas (kill zones), battle positions and flight routes are therefore possible.

This article describes how one aviation unit, the 503d Aviation Battalion (CBT) of the 3d Armored Division, derives maximum benefit from this opportunity to train and prepare in the area it may one day be required to help defend.

Since becoming an integral tactical element of the 3d Armored Division in 1977, the attack helicopter companies and aeroscouts of the 503d Aviation Battalion progressively increased coordination with divisional maneuver units, and developed extensive overlays which are used for training, and could be immediately available in the event of hostilities. The most important feature of this overlay is the target area (or kill zone) which is a relatively open portion of terrain in an area where the enemy force will be channelized. It is along an expected enemy avenue of approach, and of most significance, is selected by and supports the ground commander's defensive plan.

The size of the target area varies depending upon the terrain, however, most are large enough to contain at least the elements of a reinforced motorized rifle company. Once the target area is designated, the attack helicopter and scout pilots identify and reconnoiter battle positions and firing positions from which to best engage targets. These positions, as well as

Glossary—page 47



Scenario depicts a brigade defensive plan with attack helicopter target areas and positions from the FEBA to the rear area. Note numbering system for each target area and eight-digit coordinates for firing positions (⟶). Target area size optimizes employment of attack helicopters throughout the brigade area. Firing positions and target areas are continually updated during terrain walks, reconnaissance and coordination with maneuver commanders. The firing positions shown on this map are only representative of the actual number found within the area. The overlapping (one or more target areas between the firing positions and the actual target area they support) sometimes becomes confusing. Firing positions are actually for target areas 2,500 to 3,500 meters away, but it appears from the overlay that they are for target areas much closer. A good way to avoid this confusion is to "layer" the overlays used by the aircraft crews so that only a few target areas are on each overlay

FIGURE 2

flight routes, holding areas and FARP locations are coordinated with the ground commander to ensure they do not interfere with ground tactical plans. Through extensive terrain walks, air and ground reconnaissance and map studies, the target area concept is continually updated and expanded.

Since the division has only two attack helicopter companies, commitment is expected to occur only at critical points and times in the battle. Therefore, the entire division defensive area, from the covering force area to the most rearward defensive positions, is being analyzed and reconnoitered for target areas and for supporting routes, battle positions, holding areas, FARPs, etc. Overlays showing these positions and routes are maintained for training, and with a different set of classified alphabetical and numerical designations, are contained in OPLANs for use in an actual contingency (figure 2, page 45).

Actual firing positions within battle positions are indicated on aviation overlays by arrows (➡) which indicate an eight-digit coordinate (and firing direction) from which the target area can be effectively engaged. The result of this preparation is the ability, in the event of hostilities, of an engaged ground commander to:

- forward a request for attack helicopters with a simple radio communication such as, "largé tank force approaching X-23J (figure 1, page 44) from the east";
- capitalize on the resulting capability of the committed attack helicopter unit to quickly move over, prearranged routes to preselected positions and engage the enemy force as it enters X-23J.

Valuable time is saved and the attack can be initiated in a responsive manner with a minimum of communications. Without such a system, scout helicopter crews are faced with painstakingly slow flight into the engagement area to locate the enemy force; then they must plan subsequent routes and battle positions, and transmit them to the attack helicopter crews who must then select final firing positions. With the system, time to get the attack elements into position is increased considerably.

Initial coordination for selecting target areas was accomplished by the 503d Aviation Battalion staff through the 3d Armored Division G-3 and the brigade S-3. Detailed coordination and actual reconaissance was accomplished by assigning brigade sectors to each attack helicopter company, and allowing attack helicopter platoon leaders to coordinate with maneuver battalion commanders to establish the overlay of target areas in each maneuver battalion area.

Subsequently, the attack helicopter platoon would, during daily training operations, fly NOE missions into the area to establish routes, holding areas, battle positions and firing positions. FARP locations were added by the company operations and battalion staff to best support the overall area. Overlays of these positions were consolidated by the aviation battalion, then forwarded to division where they were included in general defense plans.

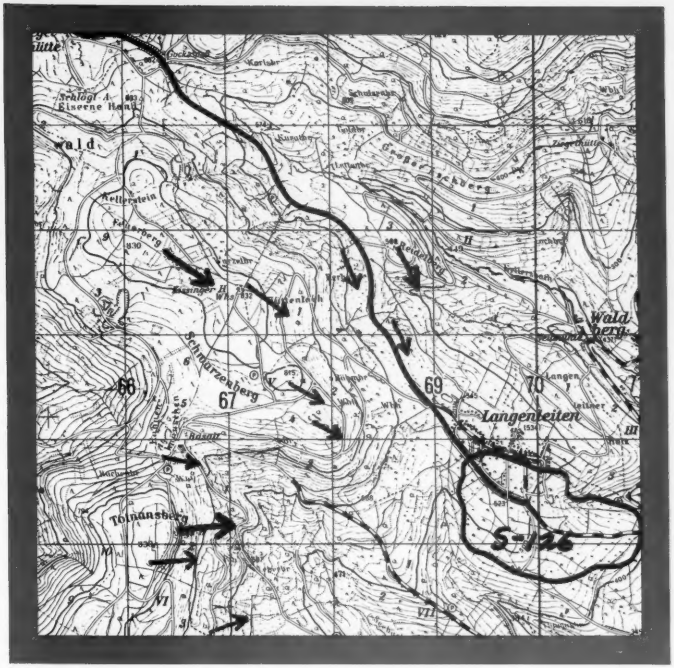
As the division area overlay began to reflect extensively planned attack helicopter target areas, the division Air Force liaison officer and divarty fire support officers were included in the planning. Particularly significant was the coordination done with U.S. Air Force, Europe in conjunction with the JAAT concept. The response and coordination at Air Force LO levels was positive, and target area overlays were processed through Air Force LO channels up to DASCs at corps level.

Eventually the planning was designed to reach a point where a maneuver battalion commander requesting additional fires on X-23J could receive attack helicopter, tactical air, artillery, or any combination, depending upon which was available and appropriate.

Can such a concept work during field training exercises? Yes it can! In fact some attack helicopter units have used similar concepts for several years, although not to the same degree as is possible by units training daily in their GDP areas. The 334th Aviation Company (Atk Hel), before becoming C Company, 503d Aviation Battalion, used this concept during several Reforgers and other major field training exercises. In particular, this concept proved extremely responsive during the period in which the 334th was supporting both the 3d Armored and 8th Infantry (M) Divisions, involving attack helicopter support.

During Reforger 78, the target areas concept was used very effectively by the two attack helicopter companies and aeroscouts of the 503d. Target areas were coordinated during nightly planning conferences between the aviation liaison officers and the brigade staff. Overlays were made and returned to the aviation battalion which dispatched copies to both attack helicopter companies and aeroscouts. The attack helicopter units would establish routes and likely battle positions by map reconnaissance, and whenever the situation allowed, would send at least a portion of the aircraft to reconnoiter final firing positions early the next morning. (Many positions selected from a map reconnaissance are actually unusable, while a short distance away a clearing that did not show up on the map is perfect for the helicopter and provides an unobstructed view of the target area. This is never known until the helicopter crew is able to actually move into the position.)

Even if aerial reconnaissance is not possible during exercises, coordination of target areas between the maneuver and aviation units (and Air force and artillery) will result in a significant time reduction following the maneuver commander's call for support. The map reconnaissance will have been completed



Glossary

ADA	air defense artillery
DASCs	direct air support center
FARP	forward arming and refueling point
GDP	general defense plan
JAAT	joint aerial attack tactics
LO	liaison officer
NOE	nap-of-the-earth
OPLANs	operation plans

Target areas normally are terrain oriented and designed to contain major elements of a reinforced motorized rifle company. In addition they are located on a terrain feature where containing the enemy force is critical to conducting a successful defense. Firing positions are selected so as to reduce exposure to enemy ADA weapons, and enable firing at maximum effective stand-off ranges compatible with the terrain

before the request, and aircraft crew overlays posted. The only step remaining upon arrival at the battle position would be final selection of actual firing positions by the attack helicopter crews (figure 3).

The size of the target area depends primarily on the decision as to what size enemy force concentration would constitute a threat to the defensive sector, and, therefore, would be a likely target for attack helicopters. This decision, which should be made in advance by the senior commander controlling the attack helicopters, will result in different sized target areas for different type units and situations.

In a defense or delay scenario (assuming the covering force battle is concluded) the 6th Cavalry Brigade (Air Combat) or 101st Attack Helicopter Battalion might employ attack helicopters as soon as the attacking elements of the threat force move onto suitable terrain. This would be a correct decision because of the large number of attack helicopter units available, and the lack of supporting tanks and prepared defensive positions.

An armored or mechanized division commander stationed in Europe, on the other hand, may decide to employ attack helicopters only after it is obvious that threat force second echelon battalions are entering the battle in a particular sector, and a breakthrough is a distinct possibility. This also would be a correct decision, since the tank and mechanized forces of the division are capable of a strong defense on their own, and the division commander has little else than the limited attack helicopter assets with which to influence the action.

The point is, the size of the force against which attack helicopters will be employed (and the resulting size of the target area) is situation dependent, and should be carefully analyzed *before* the start of hostilities.

The primary advantage of the present target area concept used by the 3d Armored Division's 503d Aviation Battalion (CBT) is that it results in rapid employment in support of the engaged ground commander. It also allows continuous training in the GDP area, and integration of other supporting fires if the need arises. Just as maneuver battalions become familiar with the terrain they may have to fight on, aviators become familiar with routes and positions they can use to best support the ground commander's plans.

If and when a sudden and swift assault begins in Europe, there will simply not be time to develop, plan and rehearse "where to fight." Immediate commitment will be critical, and it is conceivable that attack helicopters will be killing tanks prior to maneuver forces even establishing defensive positions. This target area concept is one that both the ground and aviation commanders advocate; it is simple, does not depart from tactical doctrine and is extremely effective.

A final point is that these target area overlays can be developed and distributed throughout the corps. As a result, *any* attack helicopter unit, whether organic or "on loan" from other sources can be committed into the battle with rapidity and decisiveness which could very well mean the difference between victory or defeat.

ATC ACTION LINE

UNITED STATES ARMY COMMUNICATIONS COMMAND

SITTING AROUND with the gang at the Flying Round House the other day one of the local "squares" just couldn't put all the pieces of a circling approach into a neat box. Gone are the days when boxing a field meant aligning with a runway during low visibility and flying a 1-minute, 90-degree box pattern of left turns to place yourself in a position to land. The box you'd get now might be the one you wish to avoid for many years.

It takes only a few moments to straighten out both squares.

First, a 1-minute leg box pattern would most likely take you out of the terminal instrument approach procedures (TERPS) circling area for which obstruction protection is provided. For you who are curious, the protected area for a Category A aircraft is a 1.3 nautical mile radius. A minimum of 300 feet obstacle clearance is provided within this area. *Stay in the circling area provided and avoid boxes with antique handles.*

Second, a circling approach is a maneuver often conducted in weather conditions below visual flight rules (VFR) minimums in visual contact conditions. It is an extension of the instrument flight rules (IFR) operation, and traffic patterns should be left turns unless otherwise directed or restricted. If you are "cleared VOR runway 4 approach, circle to land runway 13," you should apply the circling minimums associated with the VOR runway 4 procedure. Make sure both reported ceiling and visibility are equal to or better than circling minimums before starting the approach and in the absence of any other directions, plan to cross the airfield and make a left hand pattern for runway 13. If at a controlled airfield, tower provides any directions, then you must ensure you fully understand and follow those instructions. Also, comply with restrictions which may be found on the approach chart or in the remarks section of the IFR Supplement when doing your thing at an uncontrolled airfield as well as checking the wind "T" for valuable clues.

Third, dimension is how high? Well, why low? Fly published traffic pattern altitudes when possible. Never fly below minimum descent altitude (MDA) until turning to final for landing on the assigned or proper runway—unless you are interested in spending a night at "Never, Never Land."

Consult notes on the procedure that may tell you of obstructions that exist or lighting that may not exist. See and be seen rules apply. Pilot judgment and planning pave the way for safety and are the most critical elements in the successful accomplishment of a circling approach.

Another question which occasionally comes up is what procedures are used to update sectional charts between the scheduled 6 months published cycles and how can the average aviator locate the information?

Although the sectional charts are designed for visual flight, their use is enhanced by conveying certain types of selective operational data. This selective and relatively stable data, displayed on the legend panel, includes airfield status (closed, private, civil, military, etc.), communications and navigational aids data, airspace designations and other useful information to complement the basic pilotage function for which the chart is designed. Changes in these selective operational items are made as necessary for current flight data services and reflected in the subsequent editions. A note on the legend, however, warns you—the user—that notices to airmen (NOTAMs) and related current flight information publications should be checked for the latest changes. The sectional chart producers assure us that the best available information on changes occurring between the 6 months cycle is in the Department of Defense document aptly titled "The Chart Updating Manual (CHUM)." This basic document and the monthly supplements thereto are available for your use in airfield operations planning facilities. Additional updating is accomplished in the "Aeronautical Chart Bulletin" section of the civil airport/facility directory published by Department of Commerce for Federal Aviation Administration and should also be available in your base operations.

Readers are encouraged to address matters concerning air traffic control to:

Director
USAATCA Aeronautical Services Office
Cameron Station
Alexandria, VA 22314

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8-558-6487

205-255-6487

FORT RUCKER HOTLINE

Betty Goodson
Staff Writer

THE FRIENDLY voice makes an offer that no one with an aviation-related problem can pass up: "This is the Army Aviation Center Hot Line. At the sound of the tone, please state your name, address, AUTOVON number and questions. Your questions will be referred to the appropriate source, and you will be contacted by telephone or letter within the next 3 days."

A source of information at the U.S. Army Aviation Center, Ft. Rucker, AL since June 1979, the hot line uses *AUTOVON 558-6487 or commercial 205-255-6487.* Messages are recorded and then transcribed the next duty day by personnel in the Word Processing Center of the Directorate of Training Developments (DTD). Officials in DTD send the transcripts to the "appropriate source" which, in turn, takes the necessary action.

There have been hot lines at Ft. Rucker before, but the decision was made last year that a centralized number was needed for people in the field to call when they had questions about the training programs or other aviation-related services provided at the Army Aviation Center.

An exception to the centralized idea is an answering service in the Training Literature Management Branch, Department of Academic Training, Directorate of Training. It is AUTOVON 558-3098 or commercial 205-255-3098 and is used to request programed texts, lesson plans and other materials for courses taught at Ft. Rucker.

It is believed that the foregoing will be of special interest to National Guard and Army Reserve units. If questions arise during their weekend training periods, calls can be placed to Ft. Rucker; and the replies probably will be available before the units' next training.

Both the hot line and the answering service will record messages 24 hours a day, 7 days a week. It is recommended, however, that regular telephone numbers of the agency which can answer a particular query be used during the post operating hours (0730 to 1615 CST, Monday thru Friday). That will ensure quicker response, since the recordings are not transcribed immediately.

Provision of these lines is part of the Ft. Rucker command group's intent to improve communications between Army aviation users and providers. That's in addition to the friendly voices.

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